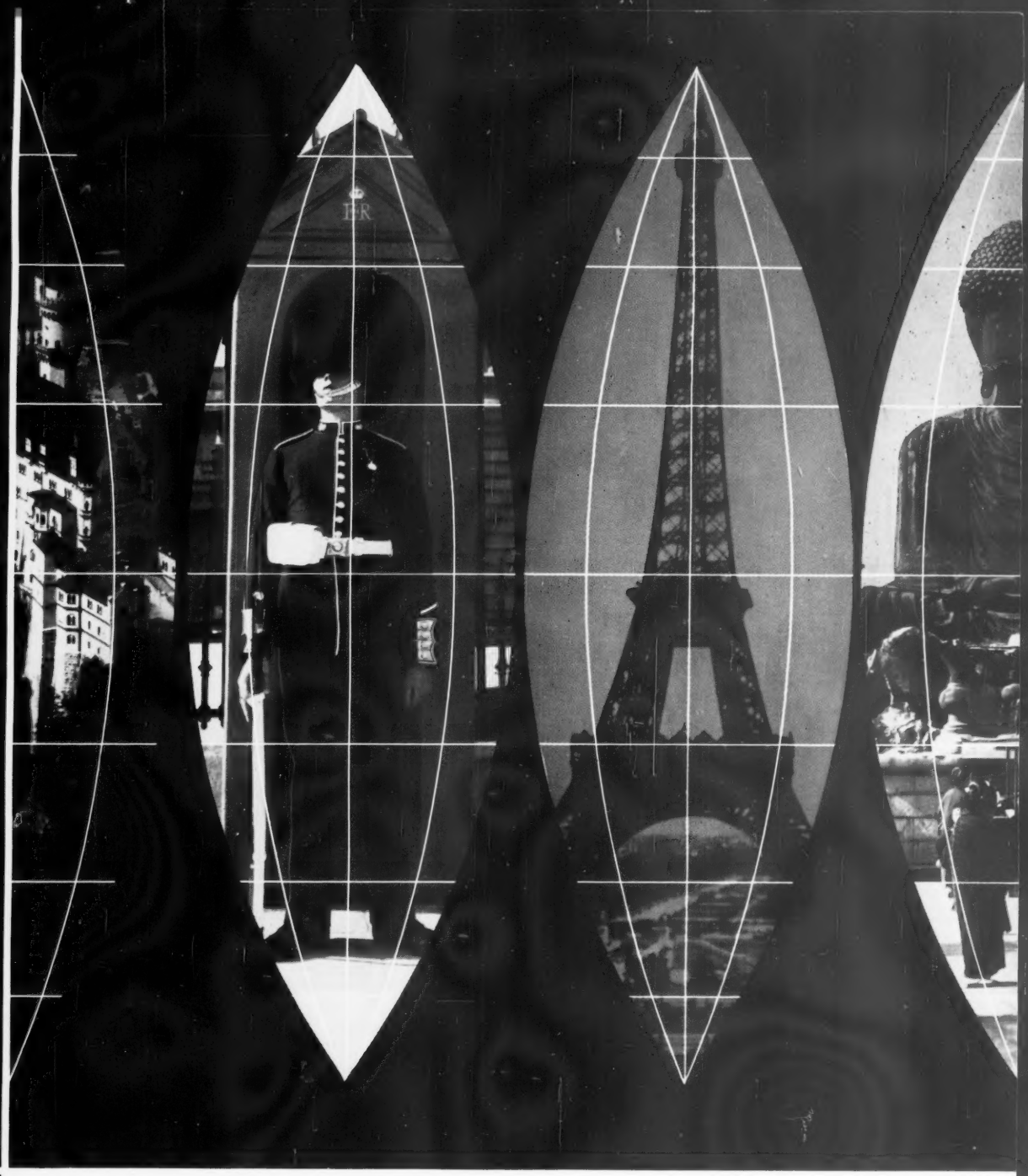
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
JULY 24, 1961



New Frontiers for Metalworking . . 56

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CONTOUR BORIZING...

Adding Accuracy for Tape Control

by R. W. Mason
Chief Inspector
The Heald Machine Company

Three years of design and manufacturing experience and an outstanding background of performance records, on tape-controlled Model S Bore-Matics, have made two things clearly evident.

First – accuracy and reliability of these contour Borizing machines have proved to be outstanding. Tolerances of ± .0001 are repeatedly obtained in routine production.

Second – these results stem from a design and manufacturing accuracy which produce a unique machine capable of utilizing the full potential of today's most advanced numerical control systems.

To obtain this accuracy in building the machine, unusual manufacturing and assembly procedures are required and exceptional quality control and inspection techniques are employed. Some of these are of particular interest.

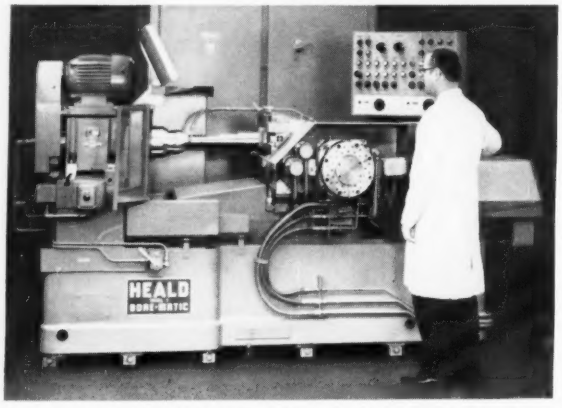
To prevent dimensional changes due to thermal effects during machine assembly, all work is done under controlled temperature in an air-conditioned room. To prevent strain and distortion, all screws on critical assemblies are tightened with torque wrenches to pre-determined design pressures.

All elements of straightness, alignment and tracking are measured with an Auto-Collimator which compares the work to a beam of light and reads to an accuracy of 0.1 of a second of arc (one second of arc is equal to .000005 per inch of length). All dimensional measurements are made with electronic indicators.

Hardened steel ways are assembled and honed in place to a straightness of .000050 or less, in their full length. Table and cross slide are actuated, in increments as small as .000025, by high-precision pre-loaded anti-friction ball screws. Bearing diameters for these ball screw assemblies are bored and honed *in place* on the machine, to assure precise alignment with the ways.

Tracking along each of the two axes is measured in two planes – horizontal and vertical – and must be accurate within .000025 in their full length of travel.

Obviously control measures such as these are not conducive to mass-production methods or other cost-cutting expedients. However, the results are well worth the extra effort. These machines track and repeat to the full potential of the numerical control system, sustaining production required for today's high precision contour boring and turning operations.



Heald tape-controlled Model S Bore-Matic for boring and turning irregularly-shaped work with a dimensional accuracy of ± .0001 or better.

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

WORCESTER 6, MASSACHUSETTS

This mechanical-press forging has been cut in half to show the excess metal (within diagonal lines) an upsetter forging would probably include. Our mechanical-press forging saved 16 lb... and the cost of machining it.

thanks to ingenuity and a mechanical press

Most shops would make this forging (a cone drive gear) the *conventional* way—on an upsetter. The forging would weigh 73¾ lb.

Bethlehem, using a little ingenuity, makes it on a mechanical press. The forging weighs only 57¾ lb.

There's a 16 lb difference. 16 lb of steel our customer doesn't pay for . . . or pay to machine away.

When you make a forging on an upsetter, you're limited to punching through with a straight hole. When you make a forging on a mechanical press, you can (if you know how) forge closely to the final shape. This saves our customer a lot of metal and a lot of machining.

Why then couldn't *any* forge shop handle this job? For two reasons: (1) Not every forge shop is equipped with a mechanical press. (Bethlehem has 6.) (2) Not every forge shop is staffed with craftsmen who can make a mechanical press do tricks. (Our shop is; our men can.) Try us. You'll like the savings.

Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

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in GRINDING
and FINISHING

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Stainless steel sink frames, manufactured by R. D. Werner Co., Inc., Greenville, Pa. are satin finished in half the time using the "PG" Wheel. Recommended by a 3M representative to replace a previous method, this unique 3M abrasive tool has practically eliminated rejects while producing a more consistent final finish.

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Why not let 3M's new COST CHECK 5-4-5 Program help you to effectively investigate ways to lower costs and increase production. Discover . . .

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- If your finishing is as efficient as possible
- If your polishing can be done faster and better

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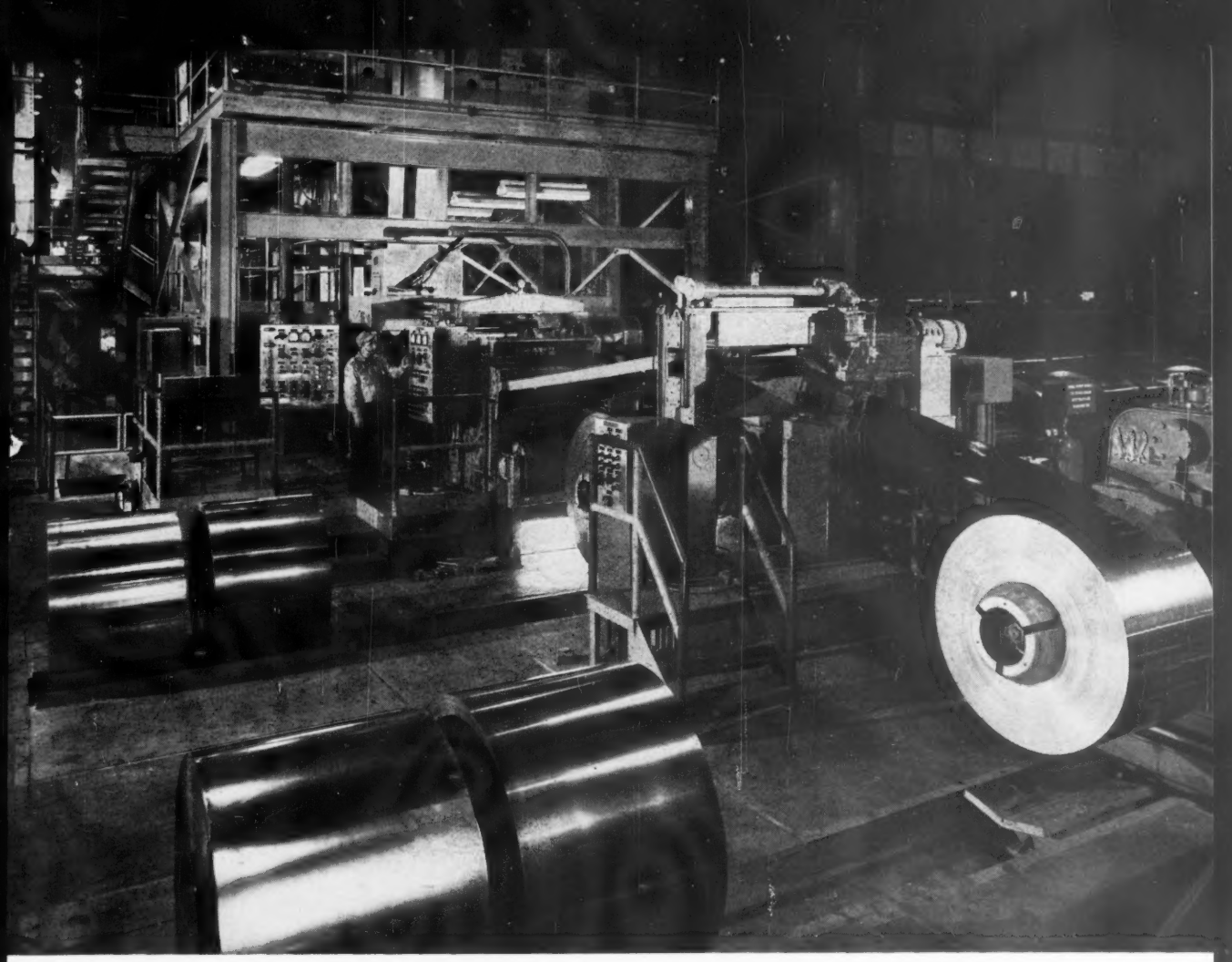
"3M" AND "PG" ARE REGISTERED TRADEMARKS OF 3M CO., ST. PAUL 6, MINN.

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY



Columbia-Geneva Steel increases tin plate production with third Wean Electrolytic Tinning Line

A third Wean Electrolytic Tinning Line was installed recently by Columbia-Geneva Steel Division of United States Steel Corporation to meet the growing demand for high-quality tin plate on the West Coast. This high-speed "Ferrostan" line incorporates the most modern engineering advances in design and construction of continuous processing lines.

This modern line is among the first to employ an electronic data-logging system to provide a "process profile" of all coiled tin plate. Other new features include improved conductor roll mountings for more rigid support, easily replaced cartridge seals for submerged rolls, and air cylinder-controlled hold-down rolls for faster, more convenient adjustment.

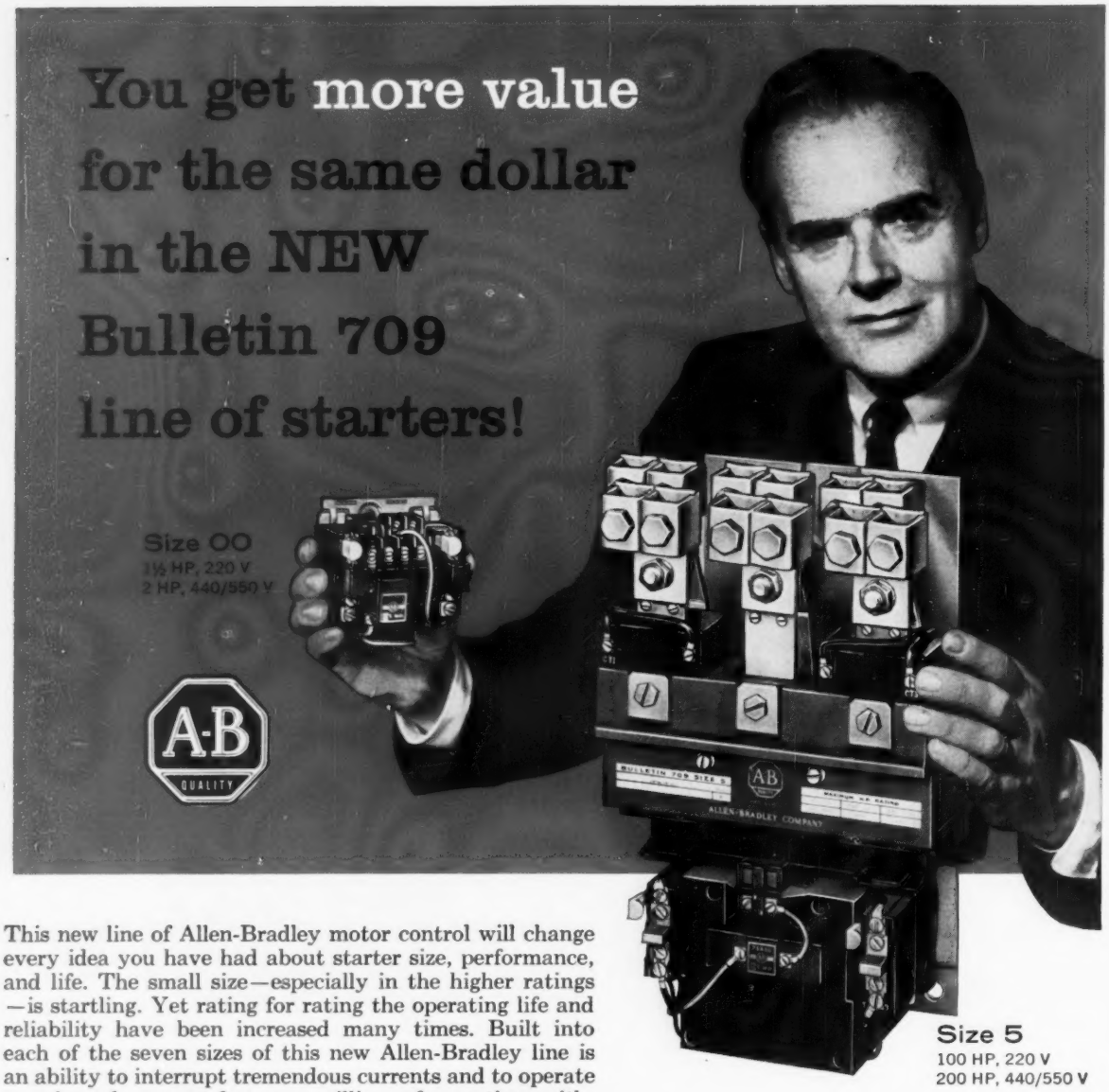
Exit end equipment provides for both recoiling and shearing. A pay-off reel is included to permit shearing and classification of finished coils while the strip being processed is recoiled.

Fifty-one of the world's electrolytic tinning lines carry the Wean name and process over 80% of all electrolytic tin plate produced today. Wean's pioneer experience in continuous processing line equipment has served every major steel firm during the past thirty years. Wean's experience and "creative engineering" stand ready to serve you.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

You get more value for the same dollar in the NEW Bulletin 709 line of starters!



This new line of Allen-Bradley motor control will change every idea you have had about starter size, performance, and life. The small size—especially in the higher ratings—is startling. Yet rating for rating the operating life and reliability have been increased many times. Built into each of the seven sizes of this new Allen-Bradley line is an ability to interrupt tremendous currents and to operate year in and year out for many millions of operations without trouble or maintenance.

The new Bulletin 709 starters are just as advanced in appearance as they are in performance. All seven sizes have an aristocratic styling and a distinctive family likeness. Brooks Stevens, famous industrial designer, has given the enclosures such an attractive, modern style that these new starters will prove a distinct sales asset on any machine or installation.

Why not write today for more information on this revolutionary new line of Allen-Bradley Bulletin 709 *quality* across-the-line motor starters?

Note the compactness of both the smallest and largest starter in the new Bulletin 709 line. Ratings up to 100 hp, 220 v; 200 hp, 440-550 v.

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1320 S. Second St., Milwaukee 4, Wis.

QUALITY MOTOR CONTROL

Nonferrous Man

Brian Wilson, left, is our associate editor in New York. He's shown here examining copper tubing with T. E. Veltfort, managing director of Copper & Brass Research Association.

Brian covers the nonferrous markets and authors the weekly column on the subject (Page 146). He also handles many other assignments. In fact, his reportorial skills are admired to such an extent by New York area industrial editors that they made him president of their Business Paper Editors Association.

Brian joined STEEL in 1957. His background in journalism includes work with Trade Magazines Inc., Cleveland, and the *Parkersburg* (W. Va.) *Sentinel*. He served as an enlisted journalist in the Navy. He's a 1951 graduate of West Virginia University.

18 Month Calendar

We have received our "annual" 18 month calendar from Harris-Intertype Corp., the printing equipment and electronics manufacturer. It runs from July, 1961, through December, 1962.

We like the idea of getting a calendar now rather than in December. It makes us feel months ahead of everybody else.

'Boyhours'

Nearly 500,000 "boyhours" are represented in the contents of hundreds of small crates that arrived last month at Fisher Body Craftsman's Guild headquarters, GM Technical Center.

The boxes contain scale model sedans, convertibles, hardtops, and station wagons designed and built by boys, 11 through 20, as entries in the 1961 model car competition. At stake are 1078 awards worth $117,000.

Sleeper

Did you notice that story on Belgium's industrial potential in our July 10 issue, p. 47? A lot of people did, because the demand for reprints has been unexpectedly high.

The editors liked it well enough to feature it on the cover, but they didn't seriously expect the large reaction from readers. A lot of the credit belongs to S. J. Rundt & Associates which supplied much of the information and to the Belgian Industrial Information Service which provided the pictures.

Reserve

Some companies, like some people, tend to hide their lights under a bushel. Technical Editor Bob Huber ran into one the other day that is so reserved that it won't even let us reveal its name for this anecdote.

"I was talking with an engineer at a forging company," related Bob.

" 'What metals do you specialize in?' I asked."

" 'All the forgeable ones,' he replied."

" 'And which aren't forgeable?' "

"The answer: 'We haven't found any yet.' "

The Answer

Last week we asked for your guesses. What was the strange looking device we pictured?

It's a chair, a Tuberosity chair to be exact. The name refers to its two support points for the seat of its user: The tuberosities—bulblike protuberances on the ischium, the three principal posterior bones comprising each half of the pelvis.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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. . Fluid Power news

OILGEAR 1921 1961 40 Years of Fluid Power

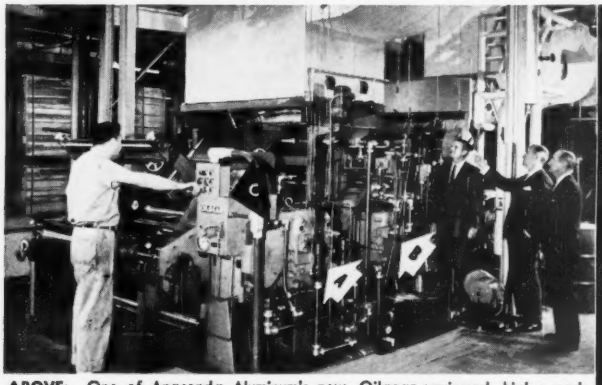
Report No. 11,806 From Oilgear *Application-Engineering* Files

HOW OILGEAR HEAVY-DUTY *Any-Speed HYTAC** DRIVE SYSTEMS ON *Anaconda's* NEW FOIL LAMINATING AND COATING MACHINES HELP SPEED PRODUCTION—CUT COSTS

USER: *The Anaconda Aluminum Company, Louisville, Kentucky, Fair Lawn, New Jersey, Terre Haute, Indiana*
(Machine Builder — New Era Manufacturing Company, Hawthorne, New Jersey — successor to Meisel Press Manufacturing Company, Boston, Mass.)

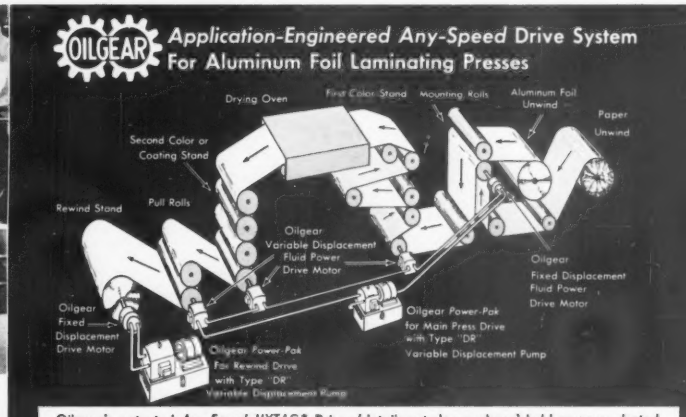
PROBLEM: Main and Rewind Drive Systems for two, new, high-speed laminators to bond aluminum foil as thin as 0.0002″ to paper stock ranging from 15-lb tissue to 0.020″ carton and food board. In addition to laminating, these "presses" must simultaneously coat and/or color the foil.

REQUIREMENTS: 1. Accurate, wide range, dependable tension control to accommodate *Anaconda's* complete range of laminating foils and paper stock. 2. Infinitely variable, stepless speed range from 0 to 1000 fpm—capable of an optimum, continuous 850 fpm running speed. 3. Maintain tension accurately in "stall" condition indefinitely without overheating—and then pick up speed smoothly and quickly without snapping the sometimes fragile web. 4. Reduce costs through reduction of scrap, repair parts inventories, and machine downtime . . . operate at nearly three times former production speeds. 5. Must be: compact, to conserve valuable floor space; economical on electric power input; capable of continuous, three-shift operation.



ABOVE: One of Anaconda Aluminum's new, Oilgear-equipped, high-speed foil laminating and coating presses—rewind end—as installed at their Louisville, Kentucky, Laminating Plant. Roll cores—8¾″ dia. . . . web width—from 23″ to 52″ . . . roll diameters—to 60″ . . . roll weights—to 4500-lb. Tension range —from ½-lb/in. to 4-lb/in. depending on weight of lamination being processed. Arrows (A), (B)—Oilgear Variable Displacement Drive Pumps. Arrow (C)—one of two pushbutton control stations at opposite ends of the press—3 emergency "stop" buttons are located at other positions.

SOLUTION: Oilgear *Any-Speed HYTAC** Main and Rewind Drive and Tension Control Systems—as symbolized in the schematic sketch—above right. These compact, heavy-duty systems have successfully met or exceeded all originally specified requirements in continuous, three-shift, high-speed operation. Oilgear Drives were selected for these new machines because of: 1. The enviable record of maintenance-free long-life in several Anaconda Aluminum Plants. For example—six out of seven original, 300-fpm laminating presses at Louisville are Oilgear-equipped . . . two operating continuously since 1946. These 14-year-old drives—and two others—*have NEVER required maintenance other than oil changes and an occasional drive shaft seal.* The other two Oilgear Drives—installed in 1948—were disassembled three years ago merely for a preventive maintenance check—haven't been "touched" since. 2. Oilgear's accurate, dependable tension and speed control over a wide range—for smooth, precise, trouble-free operation on Anaconda's *entire range* of laminating stocks. 3. Space saving—Oilgear Drives occupy less floor space . . . do not require high-speed blowers for cooling—can hold stall-speed indefinitely without overheating. 4. Economy—in electrical power input, maintenance, virtually eliminate costly machine downtime and spare parts inventories . . . and in many cases—at lower installed cost.


OILGEAR Application-Engineered Any-Speed Drive System For Aluminum Foil Laminating Presses
Drying Oven
First Color Stand
Mounting Rolls
Aluminum Foil Unwind
Paper Unwind
Second Color or Coating Stand
Rewind Stand
Pull Rolls
Oilgear Variable Displacement Fluid Power Drive Motor
Oilgear Fixed Displacement Fluid Power Drive Motor
Oilgear Fixed Displacement Drive Motor
Oilgear Power-Pak for Main Press Drive with Type "DR" Variable Displacement Pump
Oilgear Power-Pak For Rewind Drive with Type "DR" Variable Displacement Pump

Oilgear's patented *Any-Speed HYTAC** Drives (details not shown above) hold any preselected speed within ±0.1% under constant torque loads—within ±0.5% regardless of load, electric power variations, or temperature and viscosity changes . . . provide cushioned starting, remote jogging and threading . . . smooth, even let-off or build-up tensions . . . constant torque . . . adjustable tension . . . hydrodynamic braking. Applied to center shaft winders, *Any-Speed HYTAC** Drives automatically sense and compensate for changes in overall machine speed, and can automatically provide constant, adjustable, or tapering tension over a 20:1 winding range without dancer or follower rolls.

*HYTAC—A registered Oilgear Trademark

Unbelievable?—Not to Oilgear Users! There are case histories upon case histories on file of machines equipped with *Application-Engineered Oilgear Drive Systems* that are rolling along—efficiently, quietly—with over 20 years of trouble- and maintenance-free service! Some additional *installation-proved* reasons . . . the greater accuracy, precision control of speeds, torques, tensions . . . new economies of operation, installation, and valuable floor space . . . are why more and more Oilgear users in the paper, printing and converting, food and beverage, marine, chemical, pharmaceutical, primary metals, metalworking, textile, rubber, military, and other industries all agree that . . .

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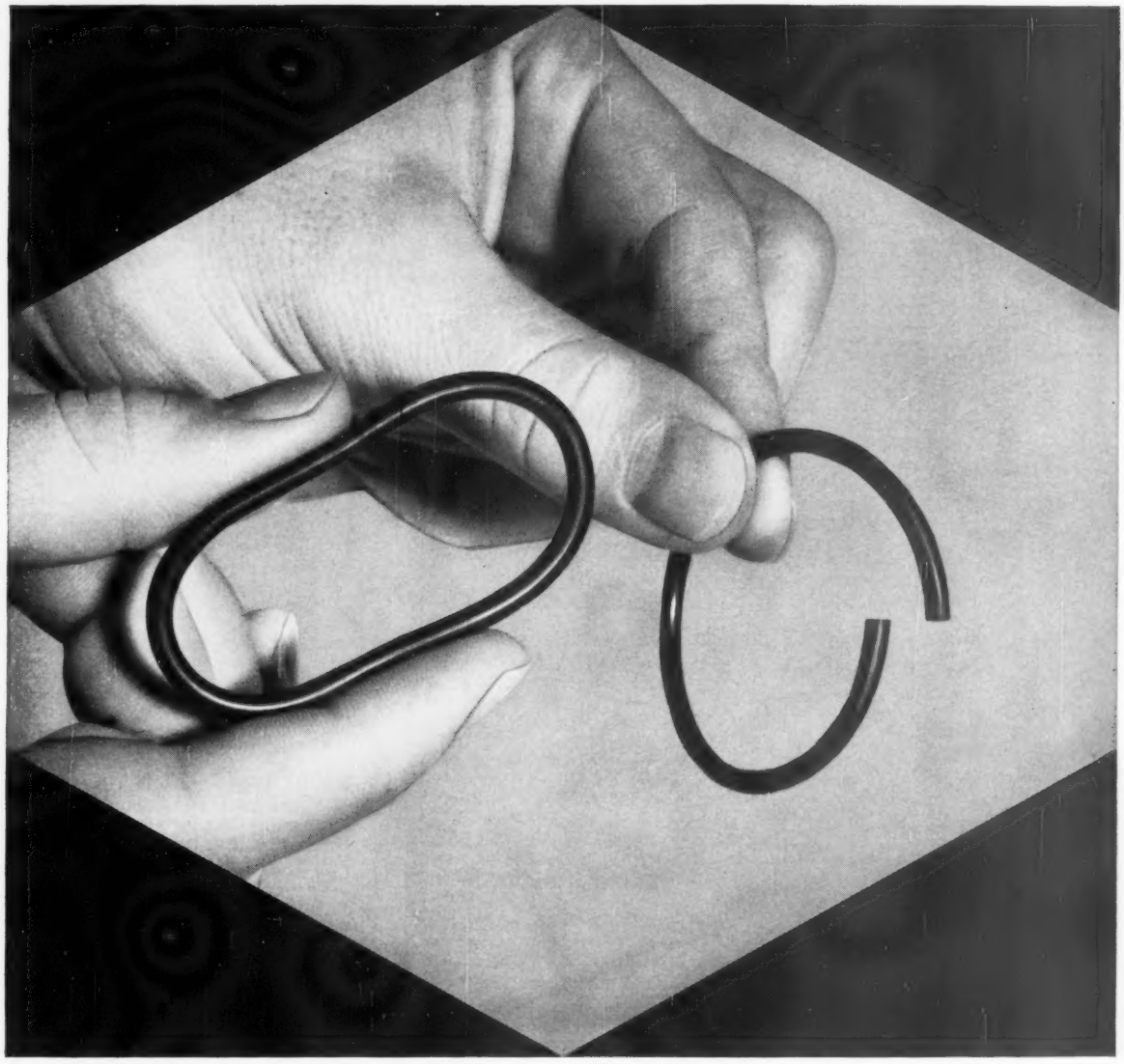

Reduce loss from leakage due to brittle seals, cut downtime needed for seal replacement. Extend the life of your Buna N and neoprene packings and seals with quality Sun Solnus oils. In a special test for oil-seal compatibility, Sunoco researchers immersed a set of O-rings in Sun Solnus oil, and a second set in another hydraulic oil, for 70 hours at 300 F each. The O-rings in the Solnus oil (*above, left*) retained their flexibility. Other rings (*right*) turned brittle as the oil robbed the rubber of its plasticizers. In addition to keeping rings flexible, Solnus oil restores flexibility to brittle rings already in service.

SUNOCO keeps seals from snapping!

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CALENDAR
OF MEETINGS

Aug. 16-19, Society of Automotive Engineers: National meeting, West Coast Sheraton Hotel, Portland, Oreg. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Aug. 22-25, Western Electronic Show and Convention: Cow Palace, San Francisco. Convention director: Calvin K. Townsend. Business office: 1435 La Cienega Blvd., Los Angeles 35, Calif. Northern California office: 701 Welch Rd., Palo Alto, Calif.

Sept. 10-12, Steel Service Center Institute: Great Lakes regional meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

Sept. 11-15, Instrument Society of America: Annual Instrument-Automation Show, Memorial Sports Arena, Los Angeles. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 14-16, Packaging Machinery Manufacturers Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

Sept. 17-21, Non-Ferrous Founders' Society: Annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert F. Scobie.

Sept. 18-20, Standards Engineers Society Inc.: Annual meeting, Hotel Sherman, Chicago. Society's address: Box 281, Camden 1, N. J.

Sept. 24-26, Steel Founders' Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Pressed Metal Institute: Annual meeting, Grand Hotel, Point Clear, Ala. Institute's address: 3673 Lee Rd., Cleveland, Ohio. Managing director: J. D. Keith.

Sept. 25-28, American Welding Society: Fall meeting, Adolphus Hotel, Dallas. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Sept. 25-28, Association of Iron & Steel Engineers: Annual convention, Penn-Sheraton Hotel, Pittsburgh: Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Aeroquip Introduces New Low-Cost Reusable Fitting for High Pressure Hose Lines

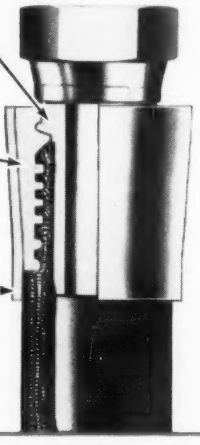
How IRON MIKE Fitting Grips Hose

NIPPLE
Designed to fit into hose without cutting inner tube. Available in 10 end fitting styles.

SEGMENTS
Grip hose reinforcement securely, mate with nipple assembly for correct positioning.

SOCKET
Forced over segments during assembly to form a rugged compression fitting that won't blow off.

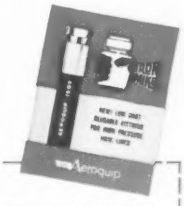
PATENT APPLIED FOR



Meet IRON MIKE, a rugged new hose fitting that provides all the field service advantages and replacement economy of reusable fittings—at rock-bottom prices. Hose assemblies made with IRON MIKE Reusable Fittings compare in cost with assemblies made with non-reusable fittings. Design is so simple that foolproof assemblies can be made by factory or service personnel in minutes.

IRON MIKE Fittings have been field tested for more than a year to assure traditional Aeroquip performance and dependability. Used with Aeroquip 1509 Multiple Wire Braid Hose, they are recommended for all industrial high pressure hydraulic applications up to 2250 psi. as well as pneumatic, fuel and lubrication systems. IRON MIKE Fittings are available in ten standard end styles for hose sizes from ¾″ to 2″ I.D.

Mail coupon below for new Aeroquip Product Bulletin No. 651, or call your local distributor listed in the yellow pages.



Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA • AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO
AEROQUIP G.m.b.H., BADEN-BADEN-OOS, GERMANY
AEROQUIP PRODUCTS ARE PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Aeroquip Corporation, Jackson, Michigan
Please send me Bulletin No. 651 on new IRON MIKE Fittings and 1509 Hose.

Name_____
Title_____
Company_____
Address_____
City_____ Zone_____ State_____

GOODYEAR

NEWS! ONLY V-BELTS BY GOODYEAR

to give you sets matched in length to pull together

What's more, Green Seal V-Belts give you—

True dimensional stability for the life of the belt—built in through the use of shrink- and stretch-resistant 3-T Process Cord or airplane-type steel cable.

Mildew-inhibited construction for protection in damp operating conditions.

Widest selection from the most complete V-belt line anywhere.

Ready availability from distributor stocks in every part of the country.

Technical assistance whenever it's needed from a qualified expert, the G.T.M.—Goodyear Technical Man.

For the best buy in V-belts call your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from GOODYEAR

GREEN SEAL ARE CODED TO 1/32"...

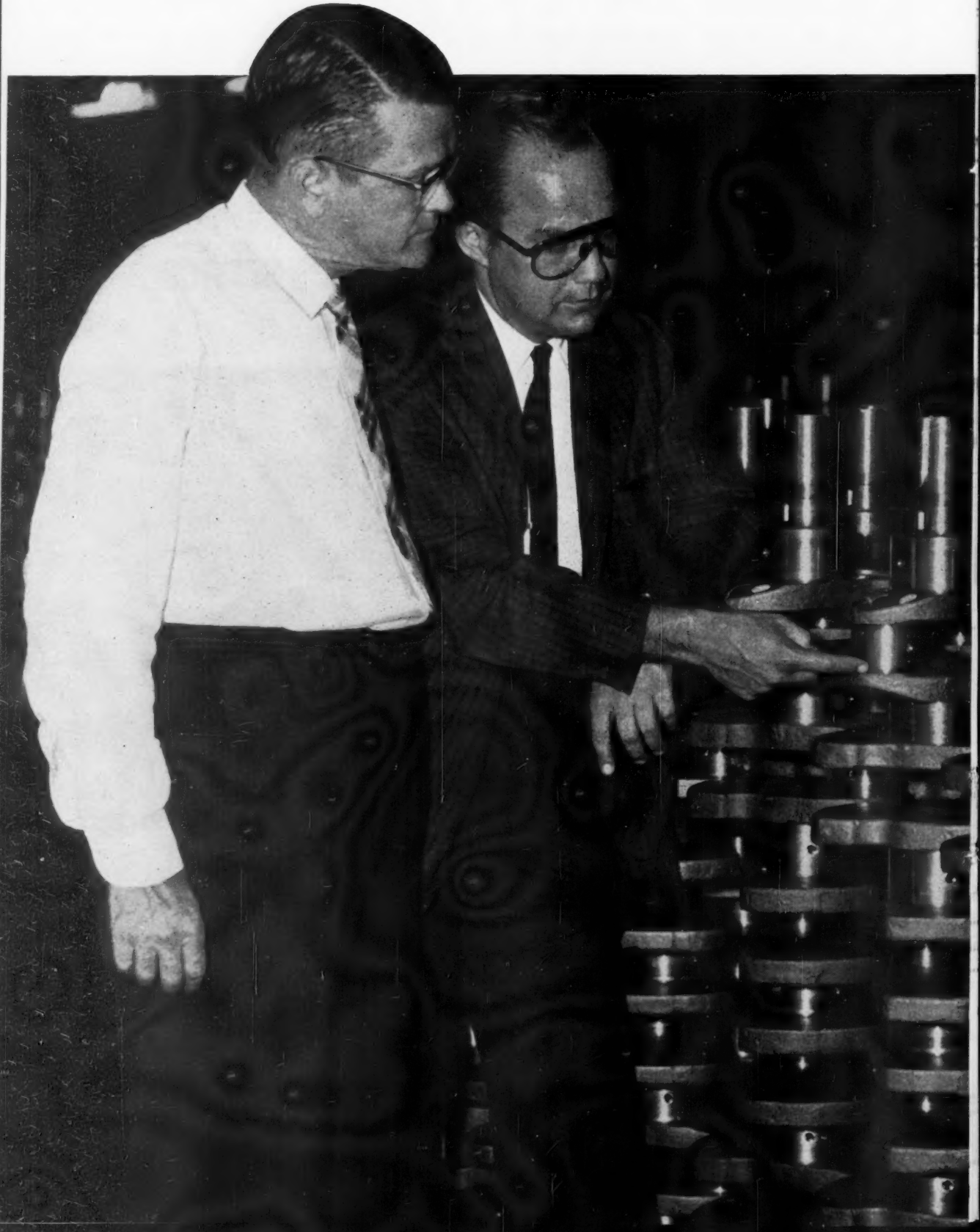
perfectly for longer, more trouble-free service

LENGTH-CODING GREEN SEAL V-BELTS TO 1/32"—NOT JUST 1/10", LIKE MOST BELTS—takes this ultra-precision machine. Only Goodyear has this type equipment, which is set by means of fine tolerance steel templates to insure accuracy. Machine readings are in the actual code numbers used to eliminate errors.

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

YEAR INDUSTRIAL PRODUCTS

How Norm Nesbitt and Allen Moore



teamed up to cut dressing costs 50% at ATLAS CRANKSHAFT

This is a good example of the way it sometimes pays to break a habit even when it's a pretty *good* habit.

At Atlas Crankshaft Corp., in Fostoria, Ohio, the dressing wheels that are used to keep big crankshaft grinding wheels at peak performance play a very important part in maintaining production at a high and constant volume. There was nothing really wrong with the 6″ dressing wheels Atlas had been using for years. They did a pretty good job and usually lasted through an 8-hour day.

But Atlas' Purchasing Agent Norm Nesbitt wasn't content with "good enough". He wanted "better" and had his eye firmly fixed on no less than "best". He got hold of Bay State representative Allen Moore and told him to go to work on the problem.

Moore is thoroughly accustomed to the kind of abrasive problems that require long and painstaking analysis. But this time, he found that it was a case of the solution being so simple that nobody had thought of it.

He simply recommended a larger dressing wheel . . . an 8-inch wheel instead of the 6-incher that was being used. Both wheels were stubbed at 4″ but buying the larger wheel reduced the cost per cubic inch of usable abrasive 50% and cut the number of dressing-wheel changes from one a day to one every two days.

Not all abrasive problems are as easily solved as this one, of course. But the point of this case is both simple and important: The most obvious improvements in grinding operations are often the most difficult to spot. Your Bay State distributor and our direct representatives are thoroughly *trained* to spot the obvious and to *dig* for what is not obvious. You can't lose and you may well gain substantially by just turning them loose to analyze your grinding operations. *Better grinding at lower cost . . . that is their business.*

Atlas operator Paul Huff sets new 8″ dressing wheel against surface of big, crankshaft grinding wheel. 8″ diameter dressing wheel lasts twice as long as 6″ wheel because both are stubbed at 4″ and 8″ wheel costs half as much per cubic inch of usable abrasive.

Norman Nesbitt, left, as purchasing executive for Atlas Crankshaft Corp. for 15 years, has encountered, and successfully met, every purchasing problem "in the book" . . . and then some!

Allen Moore, abrasive specialist, with many years experience with distributors and grinding wheel manufacturers, has a broad knowledge of abrasive wheel applications. His Business Administration degree attests to his awareness of cost-savings importance.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

ONE KEY TO COST CONTROL IN '61

Savings like these through Metalogics*

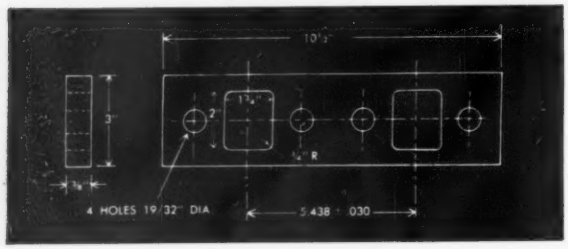
Look at these random examples and see how Ryerson Metalogics sparks real savings for hundreds of companies—in helping to search out new materials, new methods, new machines that will do the job better.

You can count on Ryerson for practical, unbiased recommendations because we offer you:

1. Exceptional knowledge of metals and their characteristics, gained through a century of service to industry as a supplier of metals and machinery for metal fabrication.
2. The nation's largest stocks of steel and aluminum —plus unsurpassed service on industrial plastics.

Your Ryerson representative is "Metalogics-trained" to help you value-analyze selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

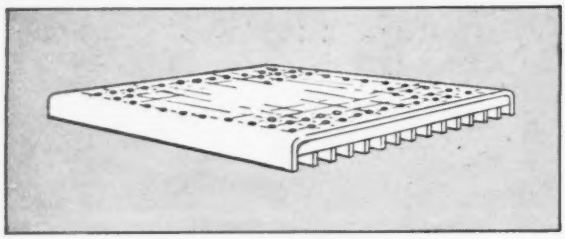
**The Ryerson science of giving optimum value for every purchasing dollar.*



Saved: $100 per thousand

PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100 per thousand pieces and quickly justified the small initial investment in dies.



Suggestion saves 85%

ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and costs, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson's experience and imagination saved 85% of the original cost.

Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛" diameter length with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an under-driven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

Production upped 30%

BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 sfm and stepped up production 30%. Ryerson's stocks include the widest range of fast-machining alloys.

STEEL • ALUMINUM • PLASTICS • MACHINERY

RYERSON STEEL®

Joseph T. Ryerson & Son Inc., Member of the INLAND® Steel Family

World Metalworking Opportunities to Grow

World steel consumption will soar to 695 million net tons annually by 1972-75, predicts the United Nations Commission for Europe. World ingot capacity is expected to reach 572 million tons by 1965. Expansion outside the U. S. is much faster than inside. For an analysis of the opportunities this will present to U. S. metalworking, see Page 56.

How Global Living Costs Compare

Global living costs for foreigners as calculated by the United Nations, using New York = 100 as a basis, are the highest in Caracas (150), second highest in Guatemala City (103). Cheapest is Cairo (62). Others include Copenhagen (70), Rio de Janeiro (71), The Hague (73), Vienna (75), Istanbul (76), Montevideo (78), Colombo (80), Karachi and Rome (81), Geneva (82), Bogota and Lima (84), Beirut (86), Manila (89), New Delhi (90), Baghdad, Montreal, and Teheran (92), and Santiago de Chile (95).

Look at the $20 Billion Recreation Market

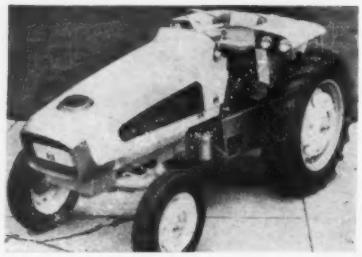
People in the U. S. will spend around $20 billion on recreation this year. About half the dollars will go for participation sports—such as boating, camping, golfing. "Economic and social factors are behind the boom," says Frank X. White, vice president, American Machine & Foundry Co. For a look at some of the ways equipment makers are exploiting the boom, see Page 64.

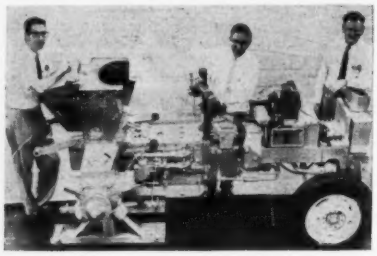
Survey of Students Gives Clues to Business

A survey conducted by *Scholastic Magazine* among 5000 high school subscribers found: Their first choices for the "large national company I would like to work for" were General Electric (19.6%), General Motors (7.2%), Du Pont (7.1%), Bell Telephone (6.7%), Ford (4%), Westinghouse (2.9%), the U. S. government (2.6%), IBM (2.2%), 3M (2%), U. S. Steel (1.6%), TWA (1.6%). They offered as their two prime reasons for selecting the companies: 1. "A good opportunity to use my education" (36.8%). 2. "A leader in scientific research" (24.5%). Asked if they thought there should be more or less government regulation of various industries and groups, they replied this way: Airlines—About 1 in 4 suggested more regulation. Banking— 3 in 10 said more. Chemical—Half said more. Coal—1 in 5 said more. Electric—

3 in 10 said more. Labor—2 in 3 said more. Petroleum—1 in 4 said more. Railroads—1 in 3 said more. Steel—1 in 3 said more. TV—1 in 5 said more. Trucking—1 in 8 said more.

Research Tractor Has Glass Fiber Skin, Gas Turbine Engine





Under the glass fiber skin (left) of its new research tractor, International Harvester Co. has paired a gas turbine engine with a hydrostatic transmission (right). The tractor has no gear shift, no throttle, no brake or clutch pedals. It uses no cooling water or antifreeze, has no transmission gears.

UAW May Take More Action to Win Transfer Rights

The United Auto Workers is studying "a number of cases" of plants being moved to the south and may take legal action to ensure transfer rights to employees. Plants named include Detroit Gasket & Mfg. Co., Lyon Inc., and Scott Valve Mfg. Co., all of Detroit. The UAW study grows out of a court decision forcing Gemmer Mfg. Co. to offer employees with seniority the opportunity to move with the plant to Tennessee (STEEL, July 17, p. 17). In another move, two employees of Vickers Inc. have filed suit in Detroit U. S. District Court asking that they and 600 other workers (members of the IUE) be permitted to transfer to the company's plants in other cities as work is moved.

Illinois Undertakes Big Employment Study

Gov. Otto Kerner of Illinois has appointed a 37-man committee to study the state's employment problems. Chairman of the group is Frank H. Cassell, director of personnel administration for Inland Steel Co. Purpose is to "explore means of facilitating the employment of jobless workers." It will analyze the labor market, determine where job opportunities exist and where the unemployed are who could fill the jobs after appropriate training. Included will be a study of automation's effect on employment, an analysis of the state's training and education facilities, an inquiry into the adequacy of placement facilities.

Aluminum Smelter for Nova Scotia?

It may be a long way off, but one U. S. firm is looking at the possibility. Harvey Aluminum Inc. representatives will soon meet with officials of the provincial government to consider initiating a joint study.

Numerical Control Moves to Grinding

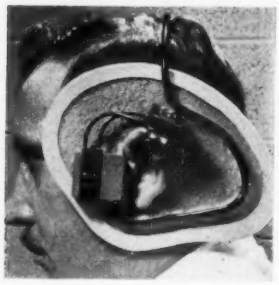
Great Lakes Steel Corp., Detroit, will soon be using numerical control to guide the final, precision finishing of large steel mill rolls. One of the first production applications of numerical control to grinding, the new machine

(made by Farrel-Birmingham Co. Inc.) will automatically control both roll size and contour. The General Electric Co. control will direct the grinder through a complete cycle — rough grinding, aligning the workpiece, semi-finishing, dressing the wheel, finish grinding, measuring and recording the roll size.

Exec Sees 1/3 Fewer Electronics Firms by '75

More than one-third of all the electronics companies now in business may close their doors by 1975, H. W. Harding, president of Boston's Laboratory for Electronics told the New York Society of Security Analysts. He said the growth rate for electronics is diminishing and it is going to become increasingly hard for the industry to absorb its high R&D costs.

New Horizons for Transducers



"Getting an earful" of the patient's medical condition is precisely what this device (left) is doing. It's a transducer that measures blood pressures and pulse rate by shining a light through the patient's ear onto a photocell. Developed by Minneapolis-Honeywell Regulator Co., it's part of a "body function recorder" that can automatically monitor the condition of a dozen patients simultaneously. In photo at right: A researcher is looking at a hypodermic needle that houses two transducers. Designed by Honeywell, the device measures the acidity in a person's bloodstream.

How Three Industries Are Doing

Members of the Gray Iron Founders' Society operated at 67 per cent of capacity in June vs. 71 per cent in May . . . The new order index (1947-49 = 100) of the Foundry Equipment Manufacturers Association fell to 101.5 in May from 115.2 in April . . . The Electronic Industries Association reports radio output in May rose 6 per cent above the April mark, TV set output rose 16 per cent, and factory sales of phonographs fell about 5 per cent.

12 More Damage Suits in Electrical Equipment

The city of Philadelphia has filed 12 more civil damage suits against 17 producers of heavy electrical equipment who were involved in the price fixing debacle. The suits claim purchases of products amounted to well over $1 million, but in asking for treble damages, did not name a specific figure.

Business Opportunities Abroad

United Bus Co., Tehran, Iran, wants U. S. private capital, knowhow, and equipment to improve and expand its operations . . . Metrica, government-owned electrical apparatus maker in Djakarta, Indonesia, wants licensing agreements with U. S. firms . . . Four firms in India want U. S. capital.

STEEL The Metalworking Weekly

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STEEL Editorial index available semiannually

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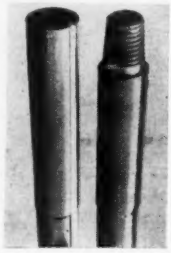
machinery, and technical assistance to establish plants making chilled iron rolls, chemical valves, China clay, and forgings . . . A German plant making precision and optical goods is for sale to a U. S. bidder . . . Ernest A. Webb Ltd. wants a license to make and sell U. S. industrial and agricultural machinery in England. For details, contact the Commercial Intelligence Division, Bureau of Foreign Commerce, Washington 25, D. C.

Friction Makes Good Joints



The commercial feasibility of friction welding (where friction supplies the heat) has been proved, say engineers at American Iron & Machine Works Co. Inc., Oklahoma City, Okla. They're using it to weld tool joints to tubing. The process is fast, low cost, and has produced joints that are said to be stronger than threaded and coupled joints (Page 102).

Australia Seeks U. S. Metalworking Partnerships

John Savage, an Australian mechanical engineer, has been appointed to help arrange joint manufacturing ventures between Australian and U. S. metalworking firms. He's at 680 Fifth Ave., New York. Australia has more than 50 firms actively seeking American knowhow and capital. Another 30 firms have expressed an interest in such tieups. More than 600 U. S. metalworking firms now have some kind of manufacturing interest in Australia.

Straws in the Wind

The nation's newest nuclear submarine, *John Marshall*, was launched July 15 at the Newport News Shipbuilding & Dry Dock Co. . . . Two electronic analyzers, to cut service diagnosis time by about 60 per cent for dishwashers and clothes dryers, have been developed by Frigidaire Div. of General Motors Corp. . . . Air Force chief of staff, General LeMay, has urged Congress to grant $750 million more for long range bombers than the administration asked for—$228 million is to be used for the B-70 program . . . Haynes Stellite Co. announces a new columbium-tungsten-zirconium alloy that it says can be fabricated by conventional means including welding. It has ultimate strength over 25,000 psi at 2400° F.

Metalworking Pulse

The Business Trend: STEEL's industrial production index returned near the preholiday mark in the week ended July 15. Look for it to fluctuate between 160 and 165 for the next four to six weeks. **Autos:** Output is dropping as makers get set for 1962 model runs. From now until mid-August, assemblage will be minimal. **Steel:** Producers expressed disappointment over failure of automakers to order as much steel as expected, cut back ingot rates.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended July 15 . . . . . 164†
  Year ago 148
  Details on Page 73
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended July 22 . . 100,000*
  Year ago 112,179
  Details on Page 70
- **STEEL INGOT OUTPUT (TONS)**
  Week ended July 22 1,850,000*
  Week ago 1,860,000
  Details on Page 130

†Preliminary. *Estimated.

From the blazing mouth
of the open hearth,
from electric furnace,
blooming mill,
bar mill:
Steel.
Hot steel, cold steel,
carbon, alloy, stainless steel—
hot headed, cold headed,
formed
into fasteners

Republic Steel Fasteners.

Fasteners for billiard tables,
oil wells,
engines.
Fasteners for flanges,
skyscrapers, truck wheels,
mine roofs, rocket ships, baby buggies,
toys.
Fasteners for industry,
America,
economy.

Induction heating coils designed and built by Electromechanical Laboratory, Republic Steel. Instantaneous induction heating eliminates scale problems, resulting in higher quality hot formed nuts and special forgings for demanding tasks

Every ninety minutes
One million fasteners.
Stove bolts, wheel bolts, ladder rods, toggle bolts,
slotted head, rolled threads, flat head, round head.
Makers of machine screws—round, flat, fillister,
cap screws hex head, flat head, washer faced.
Ultra strength construction bolts
high carbon heat treated.
Binding steel.

Machines forming carriage bolts,
lag bolts, gimlet point,
derrick bolts, plow bolts,
bolts for America.
Elevator, step bolts,
bolts for security.
Track bolts, switch bolts,
bolts for transportation.
Tap bolts, blank bolts, stud bolts steam tight.

Republic Steel Fasteners.

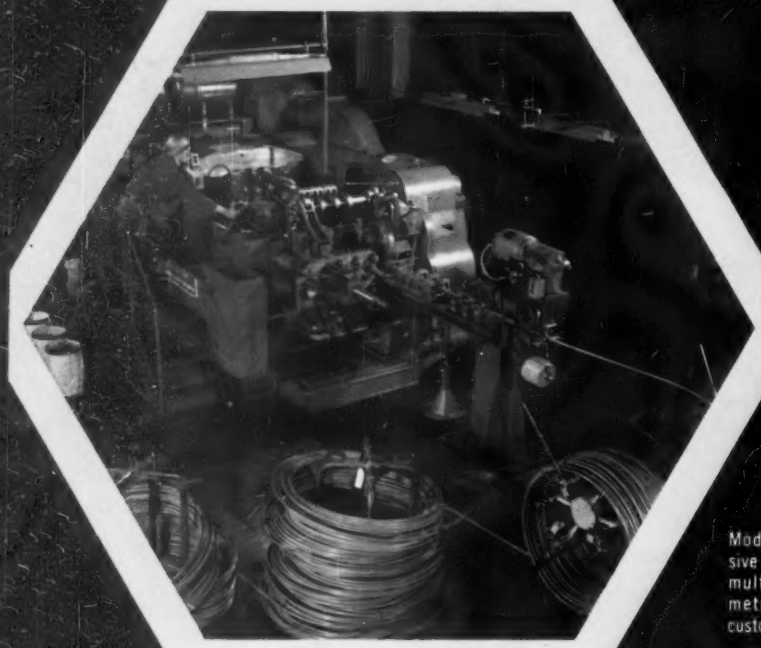
Republic nuts hug the bolts,
million bolts.
Million nuts.
Hex nuts, square nuts,
finished nuts, Nylok nuts.
Hot forge, cold forge,
mill them out of bar stock.
Double chamfered hexagon,
semi-finished hexagon,
hexagon castellated,
hex full, hex jam,
square.
Nuts.

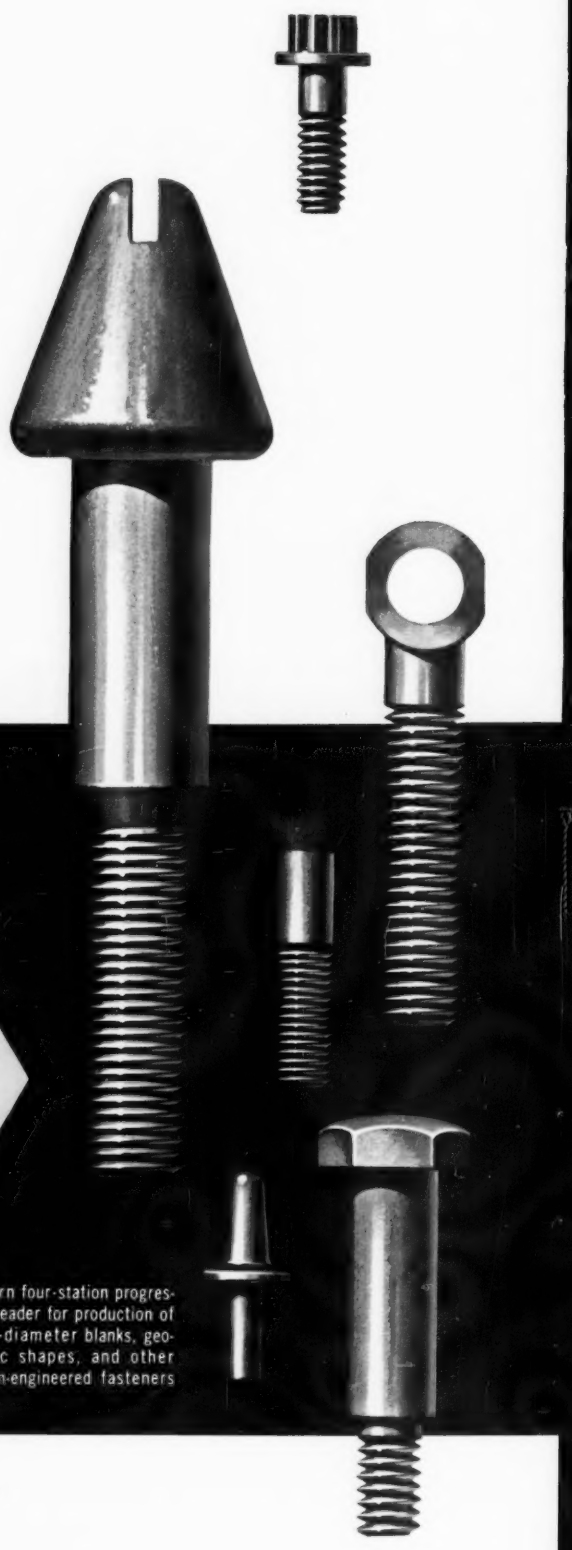
Republic Rivet Fasteners
round head, flat head, counter sunk,
truss head, core head, button head, pan head.
Cold headed.
Truss rivets, wagon rivets,
coopers, tinners, section rivets.
Count the flow of rivets. Count the pace of building.

Republic Steel Fastening.
Special needs. Special parts.
Engineer, generate
Special
Republic
Fasteners.
Cold form, hot form, single source.
Binding,
fastening,
assuring
Republic Fastening.

Power in a nut
Drama in a bolt
Impact in a rivet
Challenge in fasteners

Republic Steel Fasteners.





Modern four-station progressive header for production of multi-diameter blanks, geometric shapes, and other custom-engineered fasteners

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BOLT AND NUT DIVISION

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REPUBLIC HAS THE FEEL FOR MODERN STEEL

Steel

Printed in U. S. A.

NEWS FROM AO
Smooth outer surface of plastic shell has no projections to catch or snag.
Permanent fixed suspension assures minimum 1½" clearance between head and shell for maximum protection.
Top rib runs from front to rear to add strength, provide additional ventilation.
Fixed and adjustable suspension molded of polyethylene.
Dura-Guard safety hats and caps available in yellow, white, and gray as standard colors. Red, blue, and green on special order.
One headband only, adjusts on both sides between sizes 6¼ to 8
Sweatband attaches directly to headband with new, easy to remove or replace method.
Headband is smooth, without pressure points or attached clips and rivets.
Suspension locks into molded interior slots, is held secure with nylon retaining band.

Now: one safety hat to meet all requirements

Introducing the AO Dura-Guard . . . an *all-new* safety hat designed for *universal use*. Shells and suspensions are molded plastic, without holes or metal parts. New Dura-Guard hats and caps meet or exceed all standard specifications, and *every* Dura-Guard may be used wherever dielectric protection is required. Dielectric strength in accordance with E. E. I. specifications (April, 1961) is available in individually tested hats and caps.

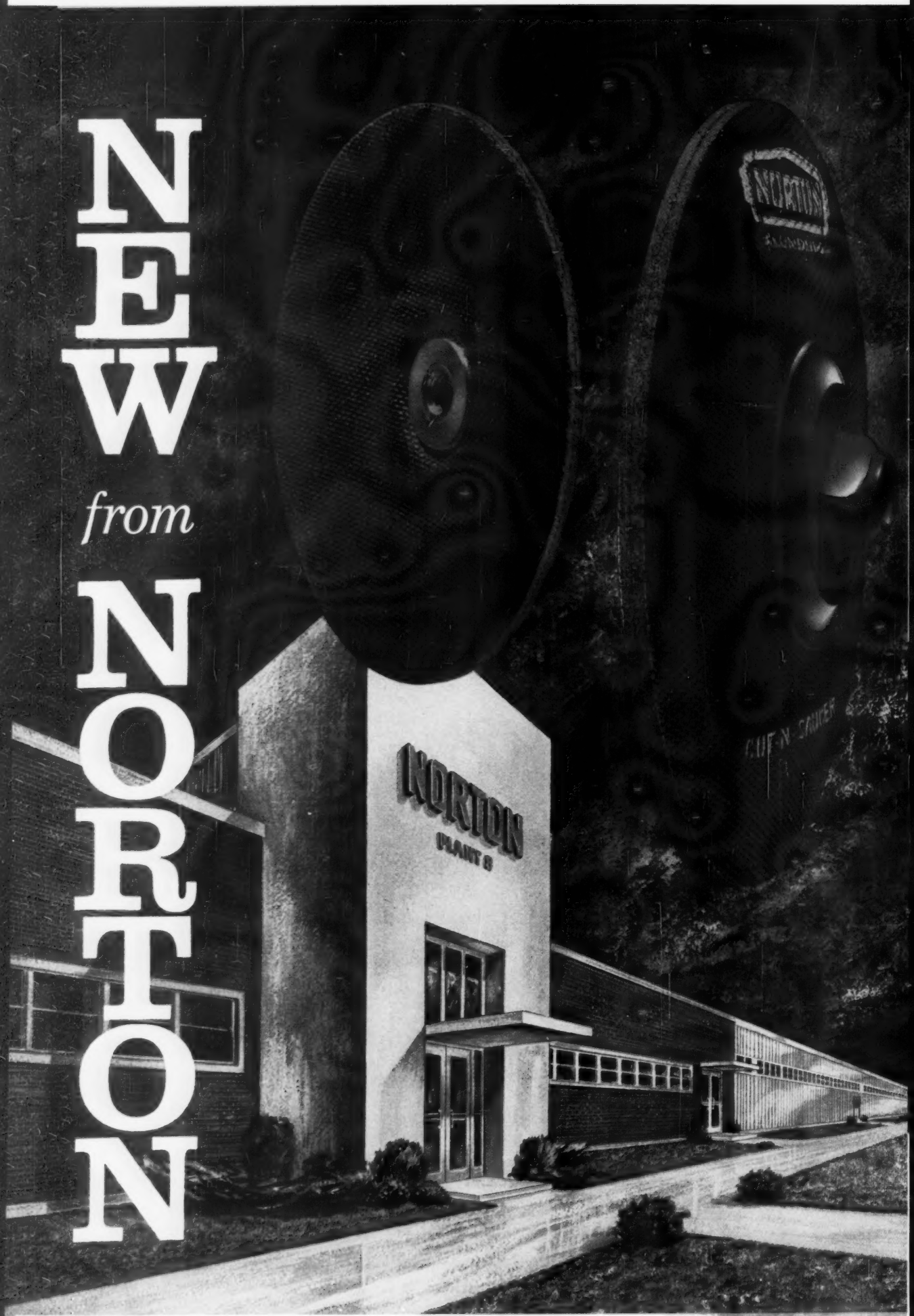
The injection molded shell is of uniform thickness throughout critical areas. Plastic suspension and headband are lightweight, comfortable, long-wearing, nonconductive, easy to clean. Headband adjusts on *both* sides to stay centered in shell, eliminate floating. Sweatband can easily be slipped out for cleaning *without removing any other part*, is made in telescoping halves for comfort and economy. Front half, which tends to soil or wear first, can be replaced at minimum cost.

For full information, contact your AO Safety Products Representative, or write for Folder S-1456.

Your Surest Protection . . . AO SURE-GUARD Products

American Optical COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS


NEW
from
NORTON
NORTON
PLANT 8

CUT-N-SAUCER wheels with DIS-CARD mounts

A new combination from Norton's newest plant

For easier, faster weld-grinding, light snagging and many other portable grinding jobs, Norton now offers you:

The only reinforced wheels that combine a saucer shape with a disposable mount.

These are the new BSA Type Cut-N-Saucer wheels with Dis-Card mounts . . . available in 7″ and 9″ diameters. They are produced in the big new Norton Plant 8, built specifically to improve the manufacture and performance of resinoid wheels.

Reinforced with layers of fibre glass, BSA Cut-N-Saucer wheels gain added advantages from the new shape. Compared with straight wheels, BSA wheels on the job can be held at angles much closer to the horizontal. Results are easier control and reduced operator fatigue.

The Dis-Card mount is equally new and vital. Unlike ordinary mounts it is no separate attachment. It is permanently secured — designed to be bought and thrown away with every wheel. This means you can change wheels in seconds — completely eliminating "lock washer" action and the usual mounting routine that can take up to half an hour. So every Cut-N-Saucer wheel you buy is already mounted — and *stays* mounted, throughout wheel life.

Yet you pay no more for a Norton Cut-N-Saucer than for a conventional reinforced wheel!

Cash in on this first opportunity ever offered to you to get advantages never before combined in a single, standard priced, portable grinding wheel. For further facts on the new BSA wheels — or on straight wheels also with Dis-Card mounts — see your Norton Distributor, or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON
ABRASIVES

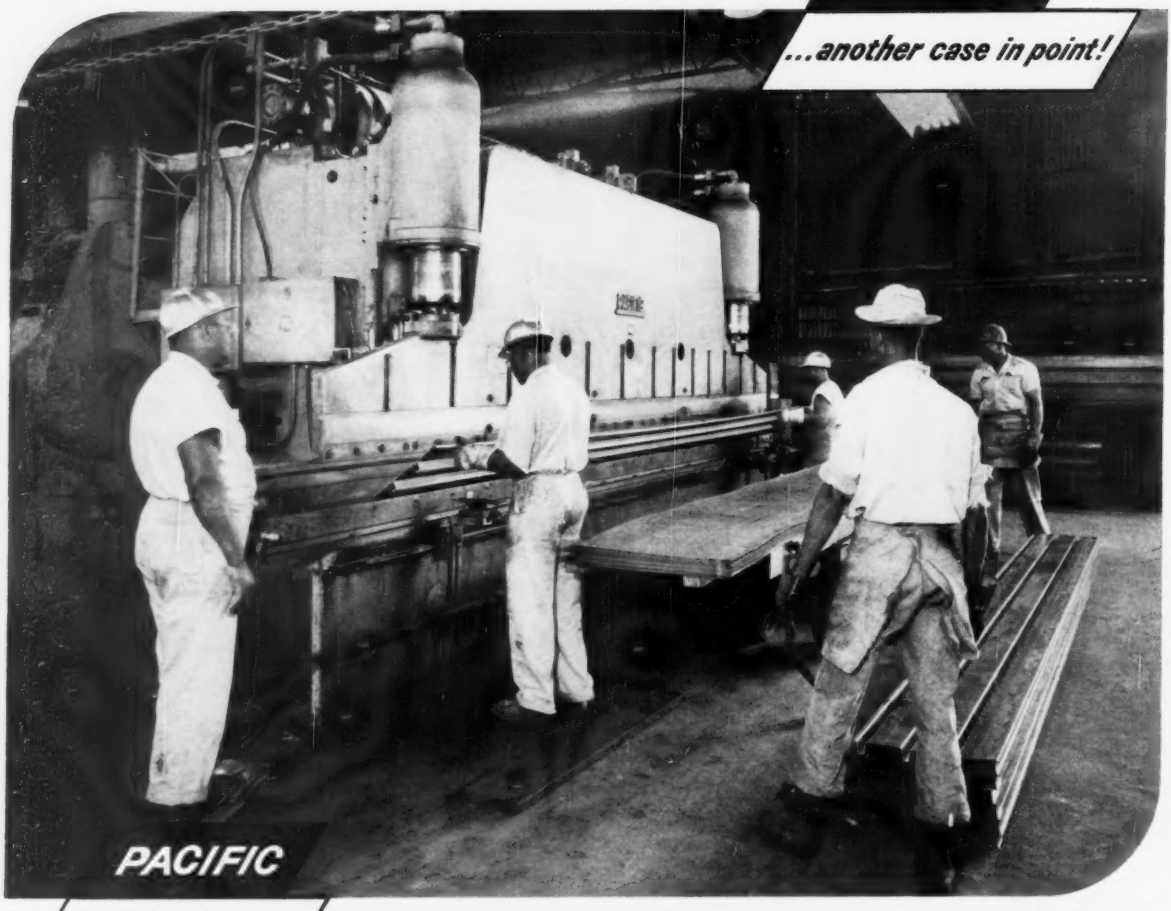
W-2017

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

You can do more jobs more profitably with a PACIFIC

...another case in point!



HYDRAULIC press brake forms roof decking of any type rapidly at lower cost

Many forming jobs that ordinarily require costly special machinery can be handled efficiently and profitably on a Pacific press brake. Pacific has a series of controls that can be quickly and easily adjusted to match the press exactly to the job. At Southwest Steel Products, Houston, Texas, several types of roof decking are formed on a Pacific press brake. Unlike expensive rolls that are restricted to a single type of decking, the Pacific is changed over in only 45 minutes for any type of decking. Producing 1600 ft. per hour of 20 ft. long by 26" wide roof decking or 20 tons per hour, the Pacific is more than adequate for Southwest's requirements of 300 to 900 tons per month. In any plant, large or small, a Pacific press brake can do a variety of jobs at a substantial savings in capital investment and operating costs.

PACIFIC PRESSES AND SHEARS

PACIFIC INDUSTRIAL MFG. CO., 848-49TH AVE., OAKLAND 1, CALIFORNIA · also MT. CARMEL, ILL.

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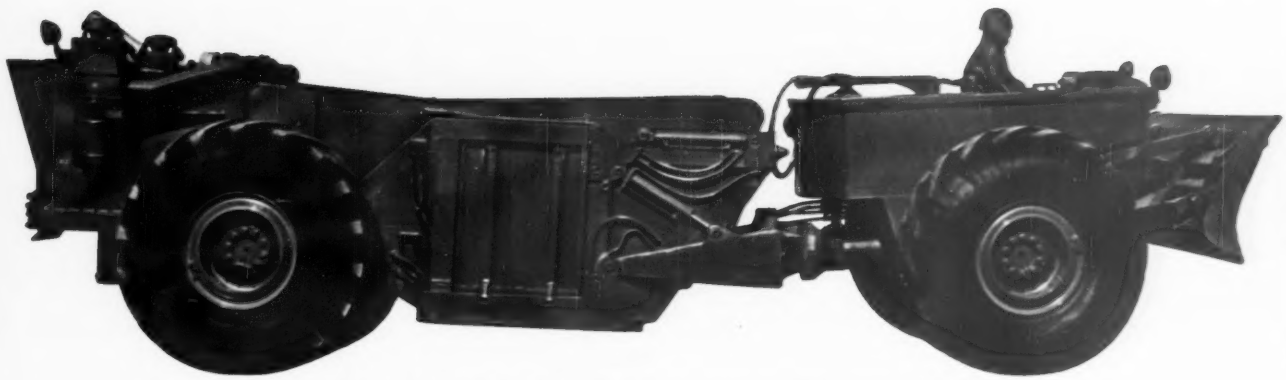
This mark tells you a product is made of modern, dependable Steel.

it digs
it flies
it swims



Army Universal Engineer Tractor built by Hendrickson Manufacturing Company, Lyons, Illinois. Strength with light weight obtained with use of USS "T-1" Constructional Alloy Steel and USS MAN-TEN High Strength Steel.

and does a dozen other things!

The Universal Engineer Tractor, rubber tired (RT), can do the work of a dozen different machines merely by substituting interchangeable sections. Basically, it is a 250 HP steel tractor-scraper dozer that can be flown in a C-130 Aircraft (they call it UET-RT) and parachuted into a combat area, ready to operate. In addition, being sectionalized, it can be quickly disassembled for transport by other types of aircraft. The tractor, although it is lightweight for airborne use, can transport 10 cubic yards of earth at 35 MPH. It was designed by Barnes & Reinecke, Inc., Chicago engineers, to the requirements of the United States Army Engineer Research and Development Laboratories at Fort Belvoir, Virginia. Three and a half tons of weight were saved by designing the yoke, dozer arms, front and rear axle housings, and basic bowl structure with USS "T-1" Constructional Alloy Steel. "T-1" Steel's minimum yield strength of 100,000 psi permitted working stresses of 60,000 psi.

USS MAN-TEN High Strength Steel with 50,000 psi minimum yield point, in the bowl, side plates and dozer blade saved more weight. The complete unit was built tough and strong with 7,500 pounds of USS "T-1" and MAN-TEN Steels.

For other military vehicles, United States Steel makes extremely tough, rolled armor plate, in addition to a complete line of weldable, formable, high strength and alloy steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, "T-1" and MAN-TEN are registered trademarks.

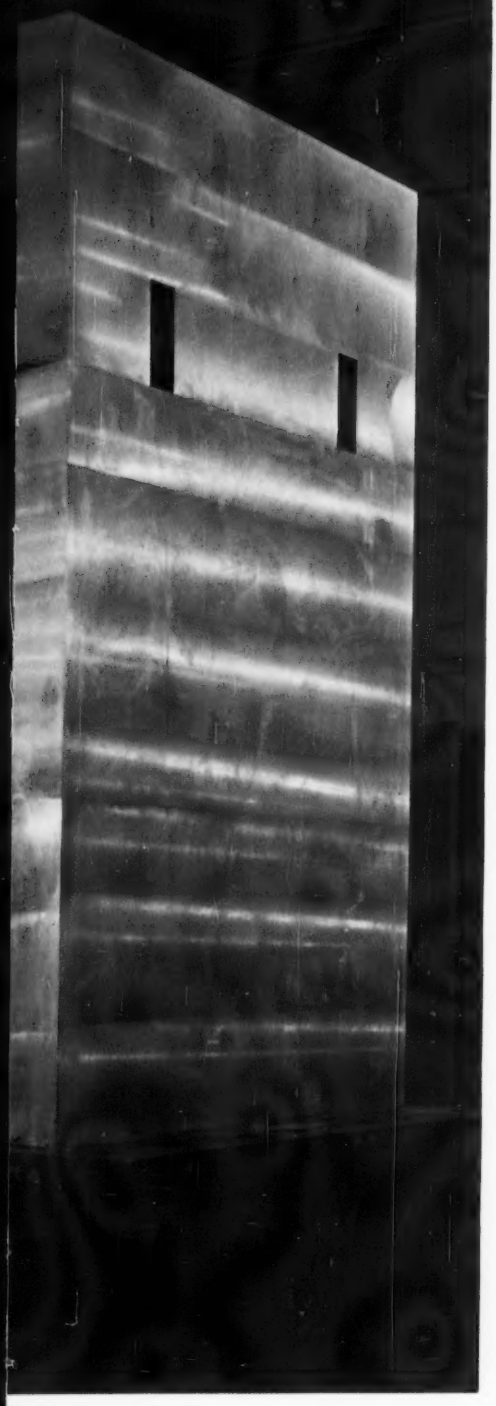
United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

USS United States Steel

Inspector measuring pole face gap to a tolerance of ±.005".

Yoke made of five forgings held together with dowels loaded to 350,000 pounds tension by a hydraulic bolt stretcher.

This mark tells you a product is made of modern, dependable Steel



259-ton magnet forgings for new 10^{15} (million billion) particles/second cyclotron

This 88-inch spiral ridge design cyclotron will permit nuclear explorations which heretofore have not been possible. The spiral ridges produce greater phase stability, prevent waste of energy. They keep the particles in focus at the tremendous speeds that are built up.

The beam current (number of particles accelerated in a given time) will be about double that of one world-famous 60-inch cyclotron and about 1,000 times that of the 184-inch synchro-cyclotron. Some million billion particles a second will be controlled by the intense, precision magnetic field created by this electromagnet.

The new machine will accelerate a variety of particles. Alpha particles (the nuclei of helium atoms) will reach a maximum of 120 million electron volts (MEV); deuterons (the nuclei of heavy hydrogen atoms) 60 MEV; and protons (the nuclei of ordinary hydrogen atoms) 30 MEV.

To meet the stability and precision requirements, designers turned to forgings. The USS Quality Forgings seen in the pictures represent about 305 tons of parts that were forged on our 10,000-ton press. After extremely accurate machining the total assembly weighed 258.8 tons.

To match magnetic properties, the pole pieces had to be from the same heat of low carbon steel, and they had to be machined, ground and polished to $\pm .005''$. The pole faces had to be parallel to within $\pm .005''$ over their entire surfaces. Steel for all 18 forgings was melted, forged, machined, heat treated and inspected at our Homestead Works. We also furnished dowels $3\frac{1}{2}''$ in diameter, hardened to Rockwell C 35 to 40, which were loaded to 350,000-pounds tension when the forgings were fastened together.

No matter what kind or size of USS Quality Forgings you buy, you get the advantages of the finest steel, the most modern equipment and the most skilled forging men in the world. Please address inquiries for our free folder on nuclear forgings to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal & Iron Division • United States Steel Export Company

USS TRADEMARK **United States Steel**

Send for new movie, "How to Weld USS 'T-1' Steels"

This new 18-minute, 16mm color motion picture shows concisely the practices involved in welding USS "T-1" Steels. If you are fabricating "T-1" Steel in your shop, this film and copies of the booklet will be a big help in demonstrating the proper technique to your welders. Fill out the coupon below and indicate the number of booklets you will need.

Included in the booklet is a handy welding heat-input calculator that helps a welder choose the proper welding machine settings. The film, together with the booklet, will help every welder to weld USS "T-1" Steels readily and successfully.

We'll gladly lend you the film and furnish enough free copies of the booklet and heat-input calculator for your shop personnel. USS and "T-1" are registered trademarks.

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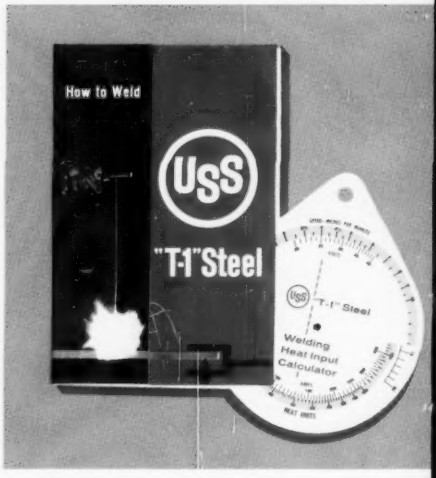


United States Steel

USS

United States Steel
525 William Penn Place
Pittsburgh 30, Pennsylvania

Gentlemen:

Please lend me your 16mm color, sound movie, "How to Weld USS 'T-1' Steels." Also, send me_____booklets of the same title. I understand there is no obligation.

Name_____

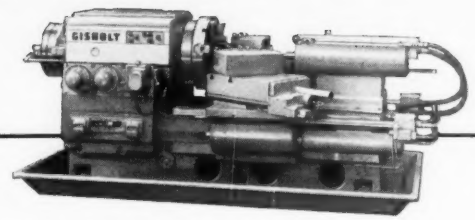
Title_____

Company_____

Address_____

City_____ **Zone**_____ **State**_____

SOMEBODY
is doing it for
LESS



Gisholt Masterline No. 24 automatic production lathe

Rugged, versatile lathe for large parts—ring and bevel gears, bearing races, pellet mill forgings, oil country parts, diesel cylinder liners and heads.

Swing—35¾"...36" between centers...Up to 125 hp motor for maximum metal removal with carbides.

Single- or multiple-pass JETracers add versatility, cut setup time and tooling costs.

Ask for Catalog 1213

No matter how it's figured, old lathes can't compete with modern automatics. Low metal removal rates—wasted manpower—high maintenance—all cut into profits.

Lot sizes are no longer the deciding factor. JETracers and new, faster setup methods make today's automatic practical for long or short run operations. To meet your needs, Gisholt now offers six automatic turret lathes and four single spindle automatics.

Ask your Gisholt Representative to show you how the *right combination* will give you peak efficiency on first and second operation work and cut your manpower requirements in half!

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

LEADERSHIP IN
INDUSTRIAL AUTOMATION

INTEGRATED AUTOMATION

for management control of your entire plant

Sharp increases in domestic and foreign competition, fluctuating market demands, and today's general profit squeeze call for operating decisions which will have an immediate and profitable effect on products, costs, and mill utilization. General Electric's step-by-step concept of Integrated Automation provides management with the soundest means of achieving this aim with a minimum of initial capital expenditure.

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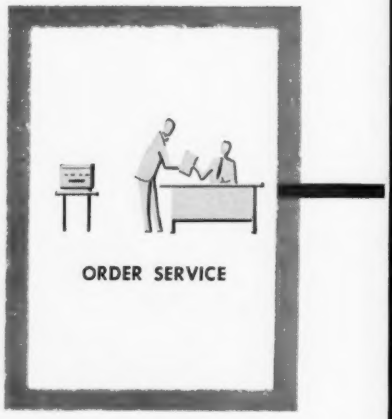
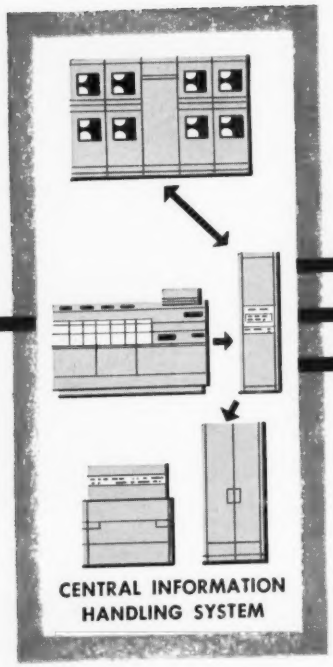


COMPLETELY AUTOMATIC order service, production scheduling, and manufacturing throughout your entire plant will result. Over-all plant performance will be in direct and immediate accord with management decisions based on incoming orders, related process operations, materials inventories and all of the many complex variables that determine profitable plant operation—*scientific management that takes guesswork out of decision-making.*

LET GENERAL ELECTRIC BEGIN WORKING with you now in your planning for future profits. Begin by calling your nearest General Electric Sales Engineer, or write for your newly revised copy of GEA-6939A, "Guidebook To Automation," General Electric Company, Section 659-07, Schenectady 5, New York.

FROM ONE SOURCE

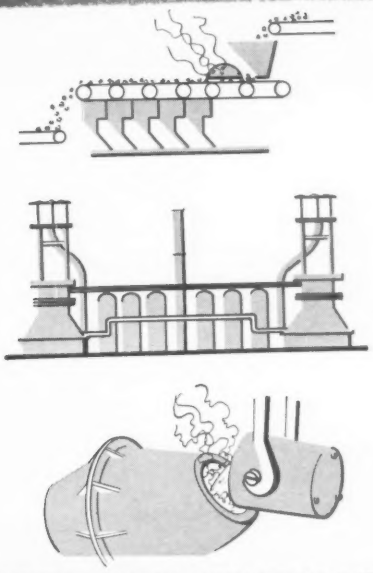
GENERAL ELECTRIC



IRON AND STEEL MAKING

AREA CONTROL SYSTEM

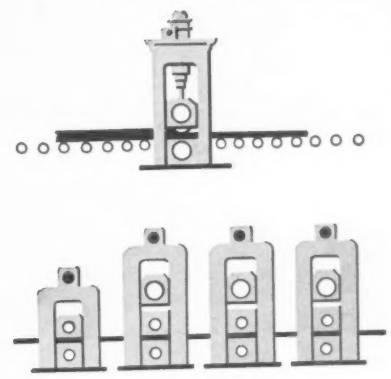
- SINTER PLANT
- BLAST FURNACE
- STEEL MAKING



PRIMARY HOT MILLS

AREA CONTROL SYSTEM

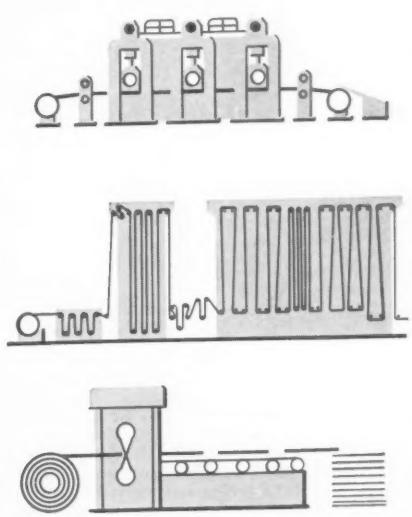
- REVERSING HOT MILLS
- HOT STRIP MILLS

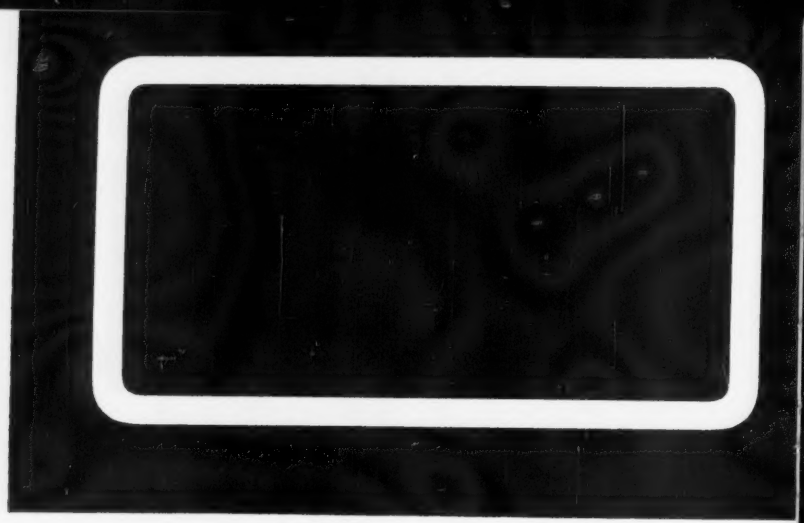


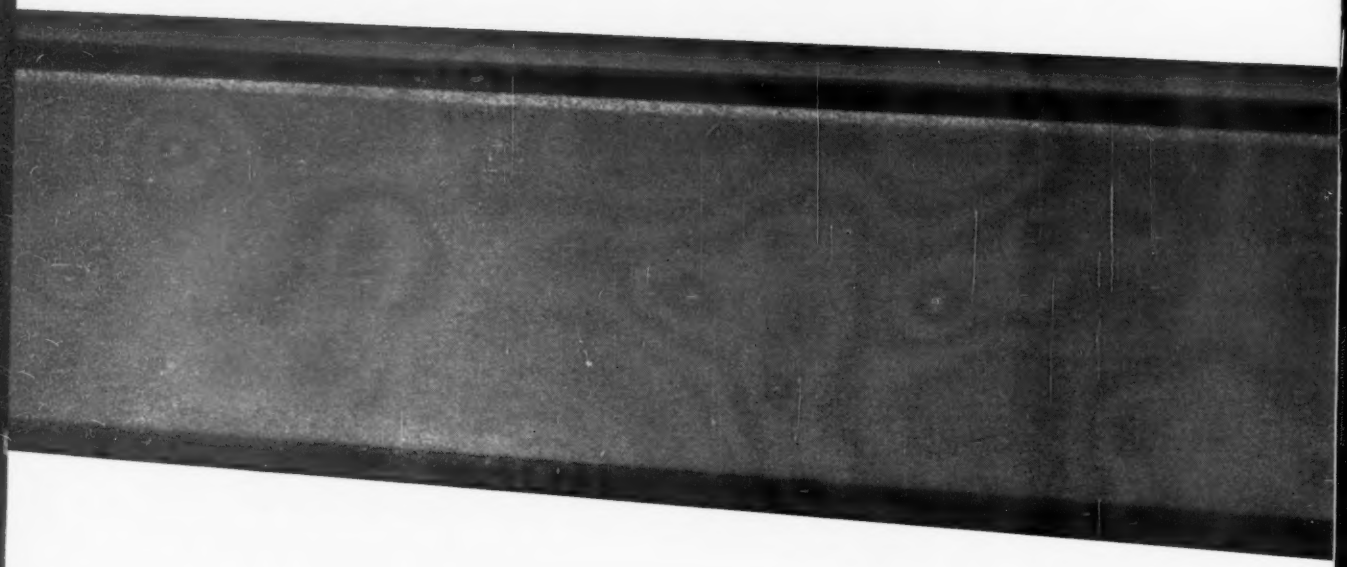
COLD MILLS AND PROCESSING LINES

AREA CONTROL SYSTEM

- COLD MILLS
- PROCESSING LINES
- FINISHING LINES







National Tube Division
United States Steel Corporation
525 William Penn Place
Pittsburgh 30, Pennsylvania

Please send me complete information about
USS National Hot-Rolled Carbon Steel
Hollow Structural Tubing.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

This mark tells you a product
is made of modern, dependable Steel.

The shape for things to come ...in structural steel

Add low-cost **USS National Hollow Structural Tubing** to the list of available structural sections.

USS National Hollow Structural Tubing is made of hot-rolled carbon steel. This product has a tensile strength of up to 80,000 psi, and a minimum yield strength of 33,000 or 36,000 psi—maximum strength at minimum cost. It conforms to the chemical and mechanical properties of ASTM A-7 and A-36 specifications. Because of the hollow design, you obtain maximum strength with minimum weight. It's compact, easy to handle and maintain. It is a highly efficient structural member especially in compression and where subjected to bending moments in more than one direction.

USS National Hollow Structural Tubing comes in a wide range of stock sizes: 1″ x 1″ to 10″ x 10″ for squares, up to 32″ perimeter for rectangles, and in lengths 36 to 42 feet. For more detailed information, send the coupon.

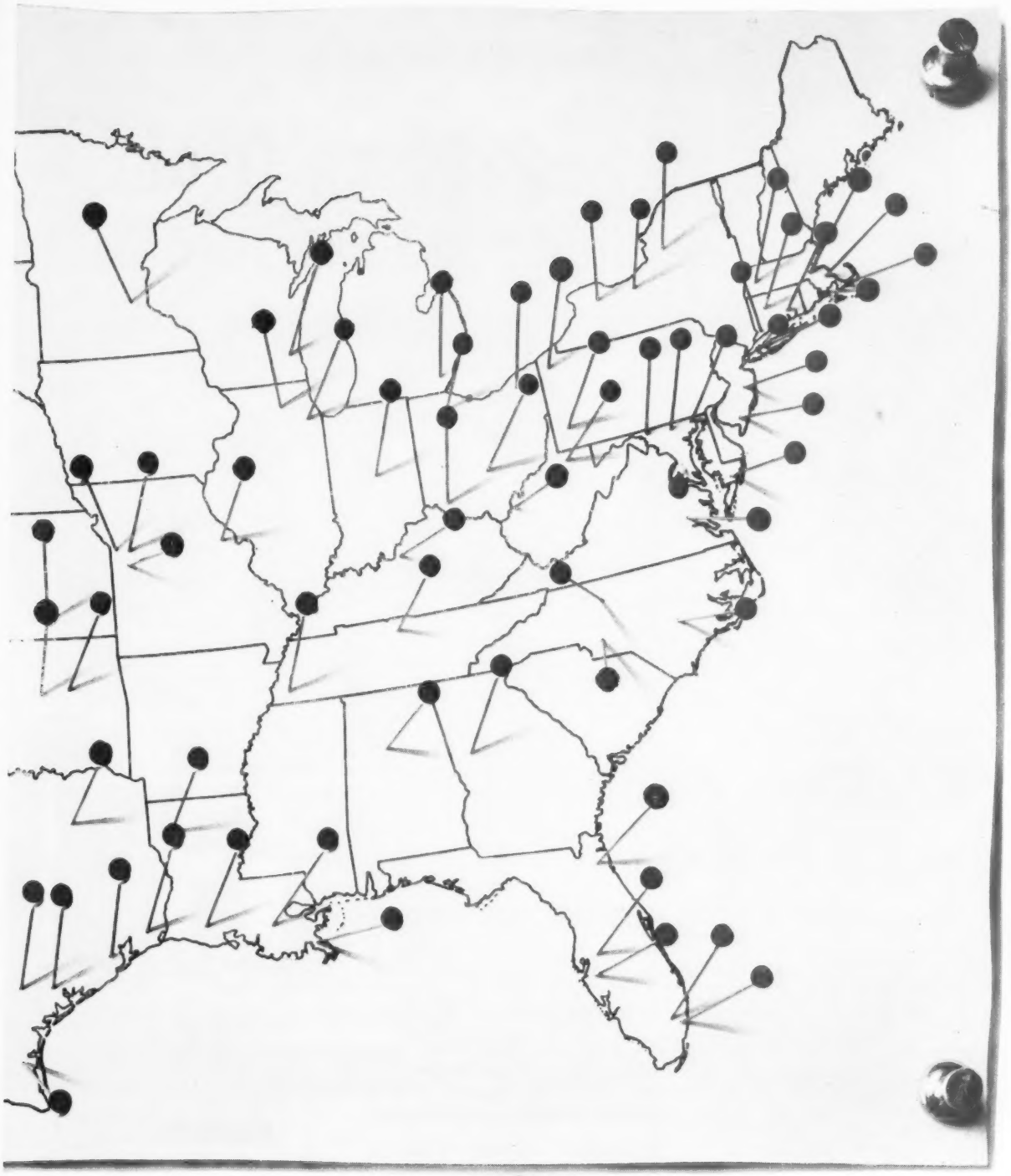
USS and National are registered trademarks

USS

National Tube Division of United States Steel

Pin-pointed supply

Wherever you are, Eastern Stainless Steel is close by. Whatever you may need to meet your schedules, it will be sped to you from one of Eastern's supply centers in 83 cities. Whenever you need stainless sheet, plate, coil or strip, Eastern will see that you get it. Phone, teletype or visit Eastern Stainless where your delivery dates are our chief concern; your satisfaction, our chief aim.



FREE BOOKLET—Full color, 16 pages. Useful data on stainless steel . . . types, size range for converted plates, Sendzimir and handmill limitations, finishes available, etc. Send coupon now for your free copy.

EASTERN STAINLESS STEEL
BALTIMORE 3, MARYLAND

Eastern Stainless Steel
Baltimore 3, Maryland

Name _____

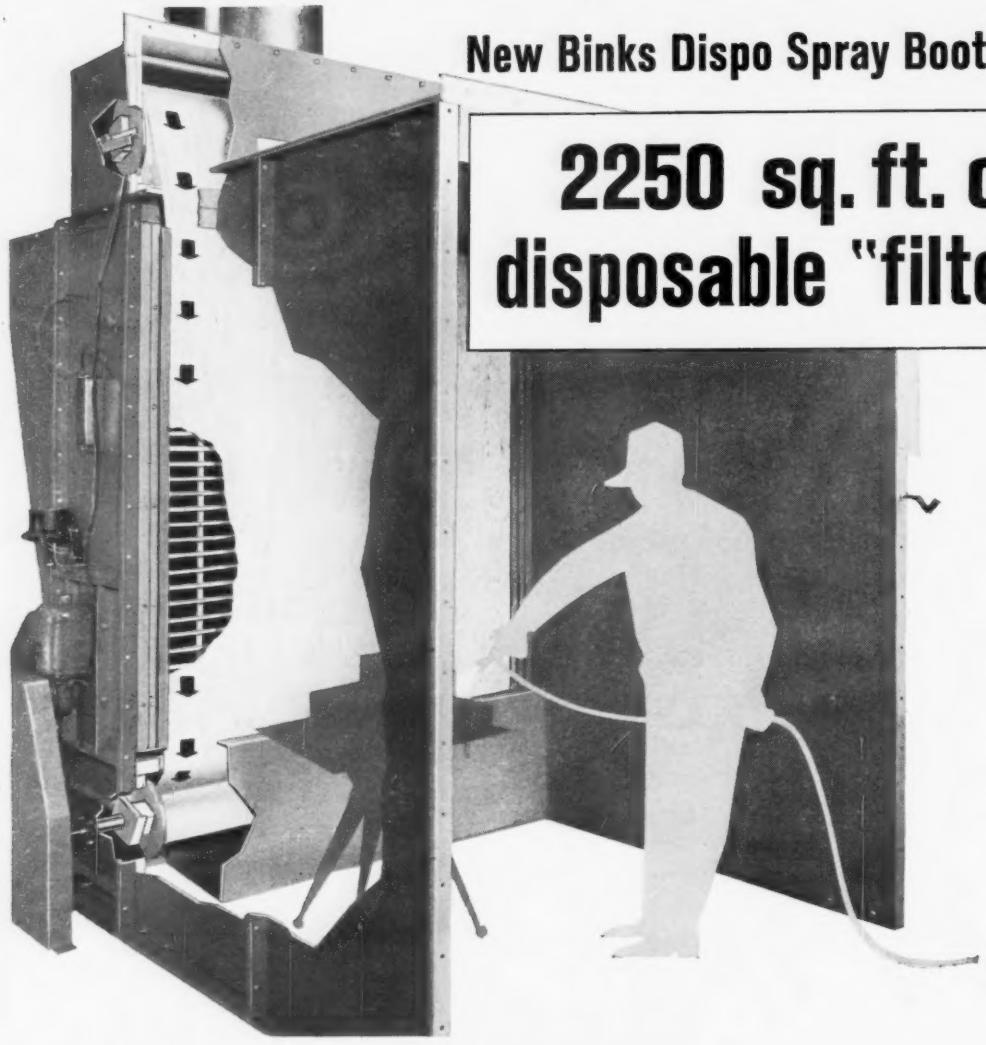
Company _____

Address _____

City _____ Zone ____ State _____

New Binks Dispo Spray Booth has...

2250 sq. ft. of disposable "filters"



automatic curtain rolls away paint overspray

The secret of the new Binks Dispo Spray Booth is a 150-yard disposable curtain which collects paint overspray . . . approximately 150 gallons...that's 2250 sq. ft. of filtering!

It's economical . . . a roll costs less than 2 cents per square foot...about 80% less than most paint filters cost.

It's safe...manufactured to meet NFPA fire standards...accepted by all major insuring companies.

It's automatic . . . when the curtain collects a pre-determined amount of overspray, a new section advances automatically.

It's simple...one man can change a roll in 5 minutes.

Ask for Bulletins A-27-14 & 15 for complete details. Your Binks Distributor has copies, or write to the address below.

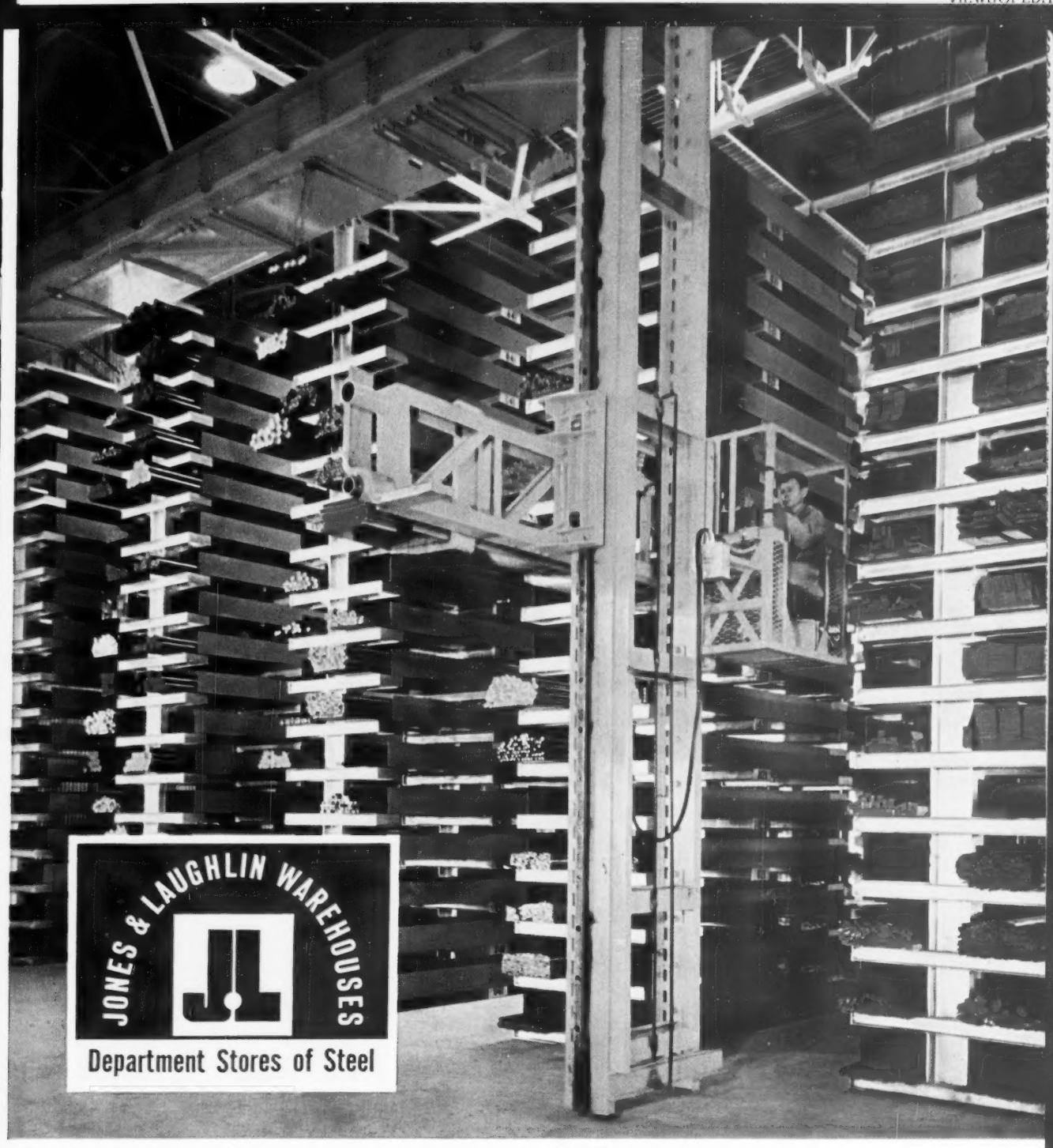
Ask about our spray painting school. Open to all . . . NO TUITION . . . covers all phases.

Binks Manufacturing Company 3148-A Carroll Avenue, Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

1237

Binks Everything for spray painting



J & L's new Cleveland warehouse speeds service with ultramodern equipment.

J & L Steel Service Centers—efficient and dependable. Ultramodern equipment at the Department Stores of Steel pays you extra dividends. This Trak-Rak, for example, is a super filing cabinet with 1350 drawers for storing cold finished bars and tubing—the most efficient setup of its kind. Equipment like this, unparalleled expansion, new buildings, the latest machinery and ready-to-go stocks of carbon steel, special steels and stainless—all add up to faster, more efficient service for today's J & L customers.

Take advantage of the streamlined, time-saver service J & L offers. Count on the Department Stores of Steel. You'll get exactly what you want—when you want it.

J & L Steel Warehouse Division

CHICAGO • CINCINNATI • CLEVELAND • DETROIT
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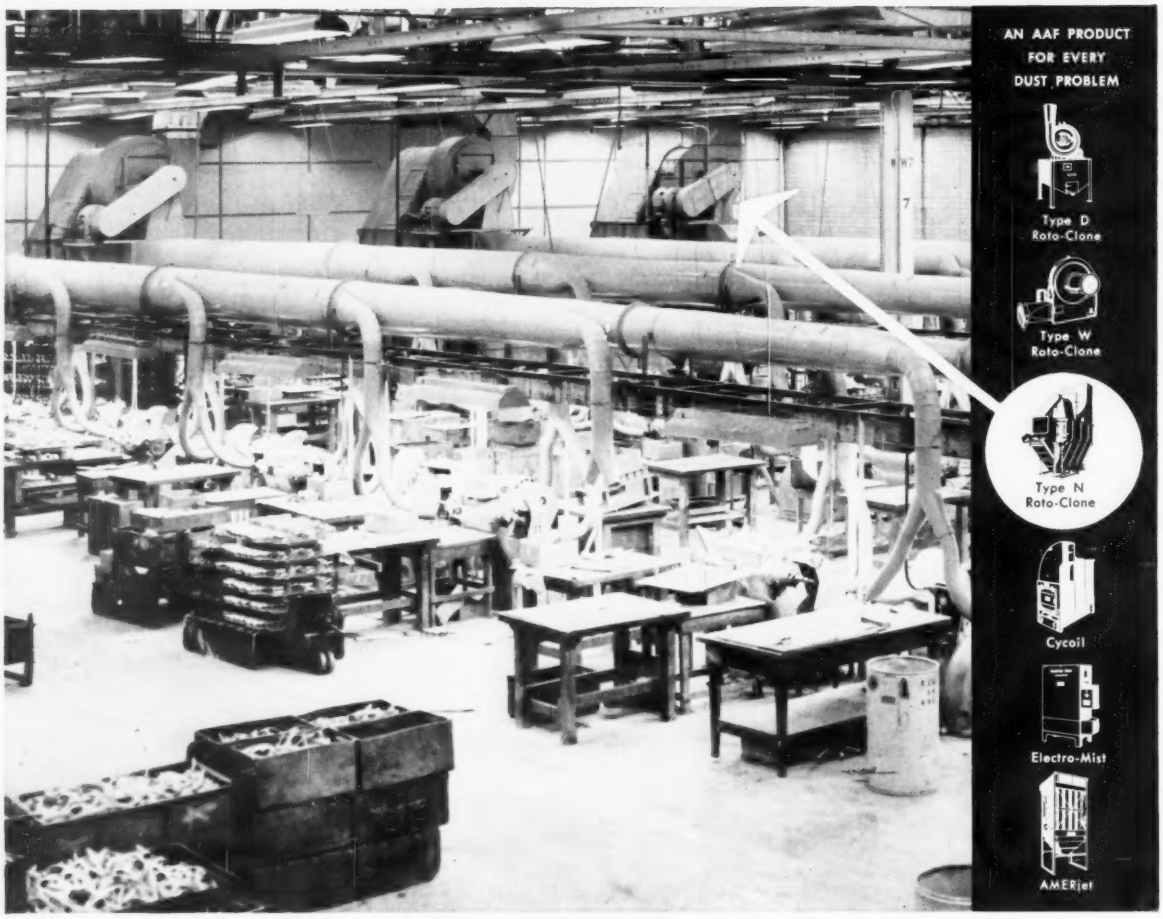
NASHVILLE • NEW ORLEANS • NEW YORK • PITTSBURGH

BUFFING



AAF Type N ROTO-CLONES stop dust for Electric Auto-Lite

● This sparkling clean buffing area in Electric Auto-Lite's Lockland, Ohio, plant is visible proof of the effectiveness of AAF's Type N ROTO-CLONE. These rugged wet collectors are exhausting 80,000 cfm from manual buffing of die-cast auto accessory parts.

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem. Where are dust, fumes or mists causing you trouble – grinding, buffing, polishing, dry machining, wet machining, heat treating, abrasive cleaning? All can be effectively and economically controlled by AAF.

If buffing dust is your problem, call your local AAF representative, or write direct for Type N ROTO-CLONE Bulletin 277. Address Mr. Robert Moore, American Air Filter Company, Inc., 443 Central Avenue, Louisville, Kentucky.

AAF American Air Filter
BETTER AIR IS OUR BUSINESS

How to pick the right rust preventive

Rust and corrosion of metal parts during manufacture and in storage cost industry millions of dollars every year. Yet this need not be. A simple application of a rust preventive can save untold dollars.

One of the common fallacies that result in rusted or corroded metals is that "any oil" will do. In most cases it will—for a while. But "any oil" is not an effective protector of metal. The formulation of a quality grade of rust preventive is the result of intensive laboratory testing.

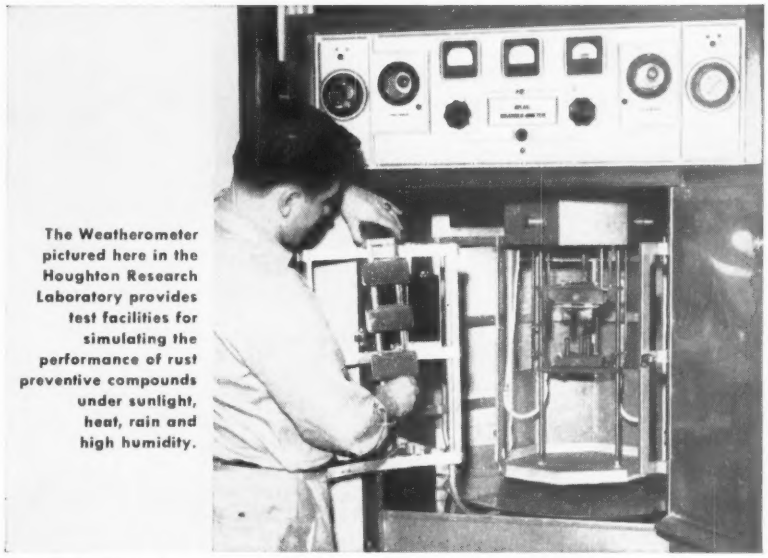
Often a rust preventive must do more than protect against moisture. Sometimes it must be "polar active"—have an affinity for metal that is strong enough to cause it to creep under water on a metal surface and actually raise the water off the surface.

Other Considerations

In certain applications resistance against oxidation is another required property. When oxidation occurs, corrosive materials are formed which attack the metal.

Another consideration is what is to be done with the part which has been protected. If it is to be plated or painted, an easily removed coating is necessary. If it is to be shipped overseas, the coating must withstand salt spray and wide variations in temperature and humidity. If the part or machine is to be exposed to weather—outdoor storage—it must resist the mechanical battering of wind and rain, and the effect of sunlight and variations in temperature.

These are some of the basic considerations involved in picking the right rust preventive for the job. Houghton has been compounding rust preventives since 1869. The familiar name "*Cosmoline*" was introduced by Houghton and is still used to designate government specification rust preventives. "*Rust Veto*" is Houghton's name for its industrial protective coatings.



The Weatherometer pictured here in the Houghton Research Laboratory provides test facilities for simulating the performance of rust preventive compounds under sunlight, heat, rain and high humidity.

Below is a bare outline of facts required in order to determine the right rust preventive for any metal, under any conditions of exposure, which will result in adequate protection at lowest cost.

Among the items which may be required to choose the right rust preventive are the following:

- **Metal to be protected**
- **Type of surface finish**
- **Possible contamination of surfaces**
- **Previous cleaning procedure**
- **Storage conditions**
- **Type of film desired**
- **Fire hazard, if any**
- **Need for removability**

The Houghton Man has a complete questionnaire form for determining the type of rust preventive best fitted for a particular need. Ask him for a copy to be used as a guide in requesting a recommendation. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

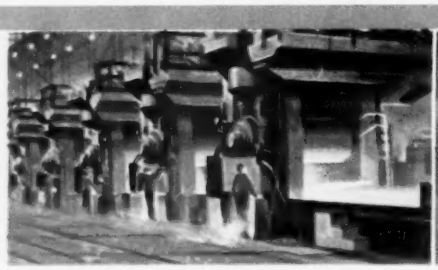
MIDWEST, NATIONAL STEEL'S NEWEST

The continuous galvanizing line shown above and an electrolytic tin plating line are the first major facilities at work at our new Midwest Steel division, strategically located in the important Chicago area. They incorporate the most advanced techniques known to modern engineering; they produce the last word in quality.

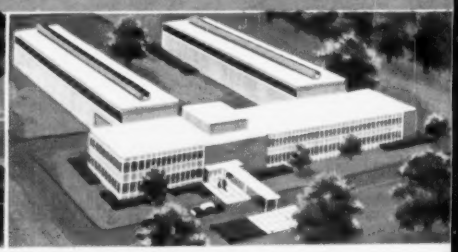
Galvanized steel made by the continuous line method is so superior that it constantly finds new uses in manufactured products of many kinds . . . products which are improved in quality and durability by the combination of steel's strength with zinc's protection. Demand for tin plate grows, too, as more items go to market in tin cans.

The galvanizing and tin plating lines will soon be followed by ultra-modern facilities for producing hot and cold rolled sheets . . . making Midwest Steel a major source of supply for the Chicago district and the fast-growing, steel-consuming area served from it. We are proud that Midwest has been constructed not only for top efficiency but also as one of the cleanest, most attractive industrial plants ever built.

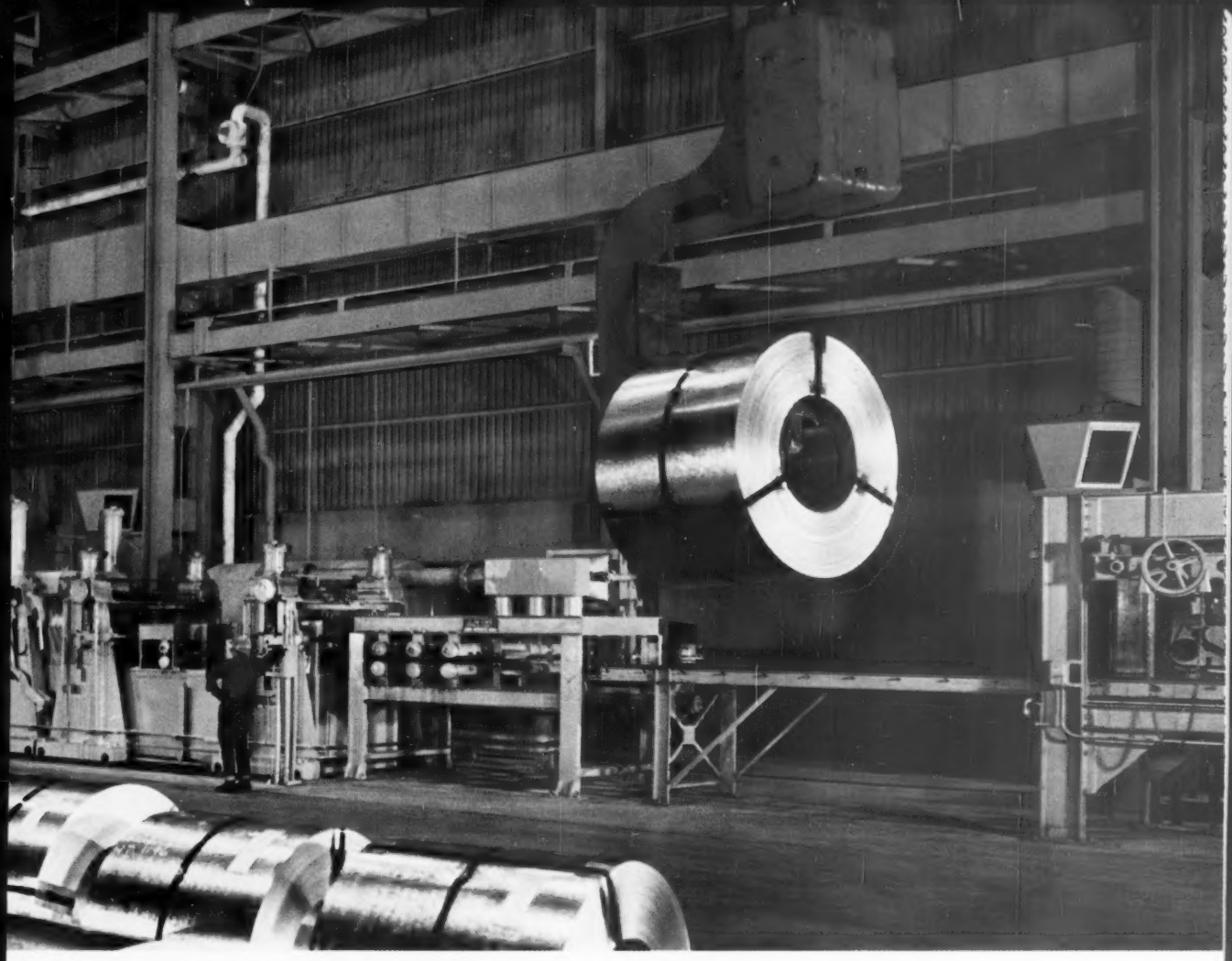
FIVE OTHER MAJOR STEPS TO FURTHER PROGRESS



AT GREAT LAKES STEEL in Detroit, the computer-controlled and operated 80″ Mill of the Future—fastest, most powerful hot-strip mill in the world—will provide more and better automobile body sheets.



OUR NEW RESEARCH CENTER will be National Steel's headquarters for the expanded, continuing exploration of new and better raw materials, facilities, manufacturing processes and products of steel.



DIVISION, SWINGS INTO PRODUCTION

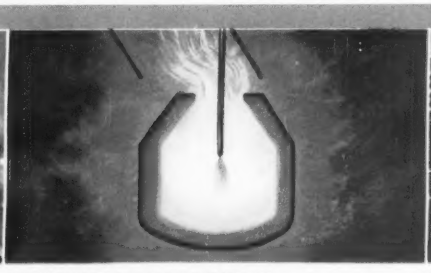
Midwest Steel is an important part of an overall construction program involving all operations of National Steel and costing well over $300,000,000. It will be substantially completed this year. The results: for our employees, more secure jobs; for our customers, a better supply of the highest, most uniform quality of steel yet produced. And for you, the consumer, still better values in the million and one products made of steel. We will be bringing you the news about other phases of this program as they swing into action.

NATIONAL STEEL CORPORATION, PITTSBURGH, PA.

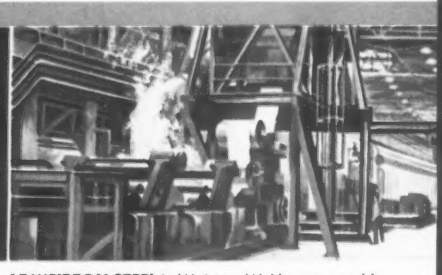
SUBSIDIARIES AND DIVISIONS:

GREAT LAKES STEEL • WEIRTON STEEL • MIDWEST STEEL • STRAN-STEEL • ENAMELSTRIP • HANNA FURNACE • NATIONAL STEEL PRODUCTS

AT STRAN-STEEL in Terre Haute, new finishing-line facilities are boosting quality and output of popular color-coated steel panels for Stran-Steel's handsome new line of contemporary pre-engineered buildings.



NEW BASIC OXYGEN FURNACES at Great Lakes Steel. Construction will start in 1961 on two basic oxygen furnaces — the largest ever built — which will add new capacity and greater efficiency.



AT WEIRTON STEEL in Weirton, W. Va., new and improved facilities throughout this division will increase the production and improve the quality of Weirton's tin plate, galvanized sheets and cold-rolled sheets.

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announcing a NEW LIQUID FOAMING RODINE

RODINE 23

So soluble it can be added to tap water! An all synthetic formulation designed for faster pickling at low temperature. Liquid RODINE 23 exhibits high-foaming, free rinsing characteristics, while retaining its solubility and effectiveness even at extreme temperatures and iron concentrations.

. . . PLUS an improved

RODINE 82A

New reaction techniques provide RODINE 82A with complete solubility in dilute acid—soluble in tap water, *too!*

. . . and still another improvement

RODINE 92A

Superior solubility provides steel mill picklers with another specialized RODINE for their particular applications. RODINE 92A incorporates a highly efficient wetting agent.

Why not send for complete information on these latest developments from the Amchem Research Laboratories.

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Works 80 hours every week with no complaints

This 35-ton Plymouth Diesel locomotive thrives on hard work at American Cyanamid's Brewster, Florida phosphate operation. For the past 3½ years it has shuttled cars laden with phosphate rock back and forth along Cyanamid's 2 miles of track . . . regularly shifted and spotted loaded cars for pickup by the Atlantic Coast Railroad.

Operators are impressed by the way this Plymouth with Torqomotive Drive gives shock-free handling, safer hauling of any load. And this Diesel unit requires only 30 minutes per day for routine maintenance.

Plymouth's high operating efficiency and low operating cost make material movement more profitable for large and small companies around the globe. Get complete details on a Diesel or gasoline operated Plymouth built specifically to meet your haulage needs. Send a brief outline of your operations to: Plymouth Locomotive Works, Division of The Fate-Root-Heath Company, Dept. A-1, Plymouth, Ohio.

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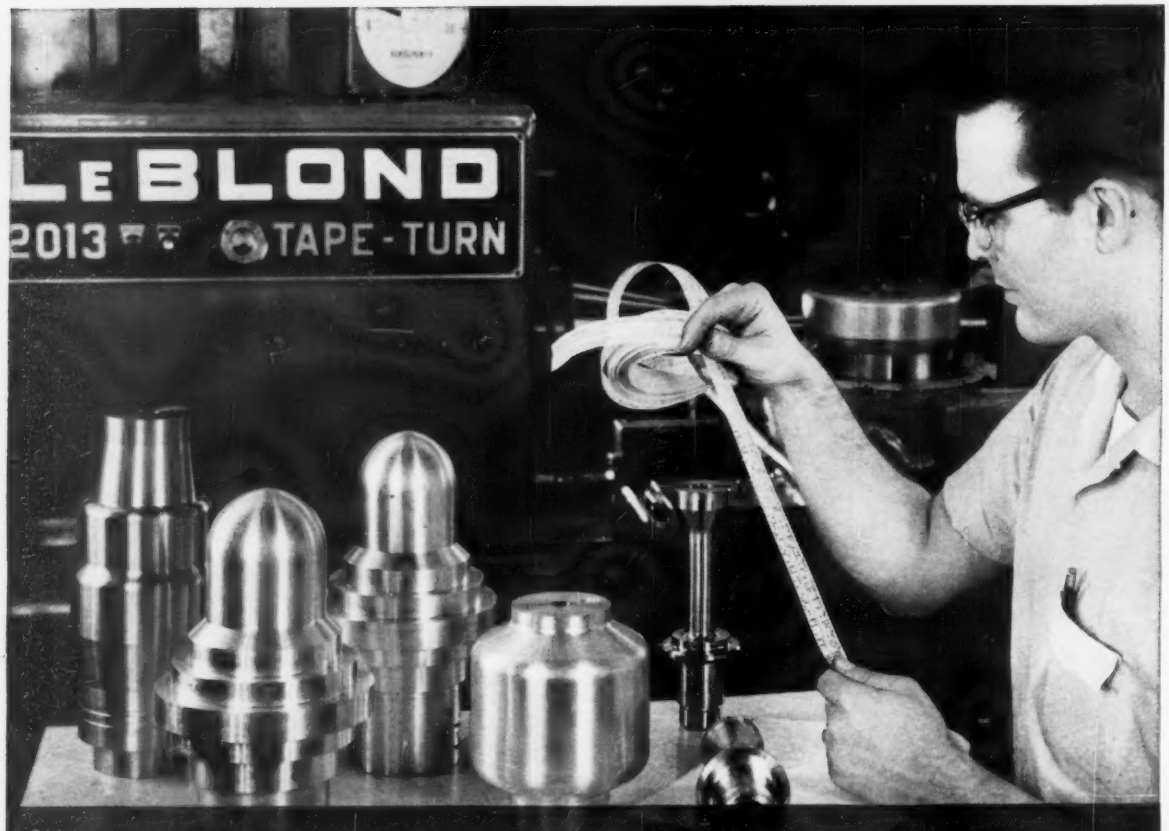
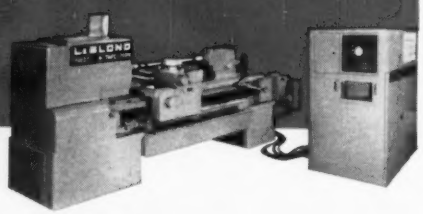


Turn your parts profitably on LeBlond Tape-Turn



In production now, Eight Heavy-Duty Models:
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For turning complex contoured parts, in job lot quantities, Tape-Turn will show you rock-bottom costs! Its continuous path Mark Century tape control puts engineering data at the cutting edge far more efficiently than any manual or tracer turning method.

Because LeBlond pioneered continuous-path turning with tape, you'll benefit by many months of experience. We can show you actual applications on production runs. Our skilled programming staff will help your engineers learn the simple routines involved in tape turning.

Simple programming is a major feature of LeBlond Tape-Turn. The General Electric Mark Century control has a built-in computer which saves the programmer time in setting up for straight cuts, tapers, arcs and blended combinations of these. For the most complex shapes, separate computor assistance is desirable. You can learn the Tape-Turn programming procedure in half a day!

Increased efficiency, reduced lead time, a permanent record in easily stored form, low-cost quality control, reduced parts inventory, shorter set-up time and lower tooling costs—plus all the reliability and precision of a LeBlond Heavy-Duty Lathe—these are yours with LeBlond Tape-Turn. Write for descriptive bulletin TWB.

"Leading the way in numerically controlled turning"

LEBLOND of Cincinnati

The R. K. LeBlond Machine Tool Company
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Growing World Market

We, along with many metalworking managers, have watched with some unease the rapid development of a new world market in metalworking. Western Europe and Japan, with efficient new factories and more favorable wage costs, have been able to underprice U. S. metalworking companies on many products in world markets. The loss of exports, plus competition from low priced imports into this country, has been a cause for grave concern to U. S. industry.

Worry over the invasion by foreign competitors has often obscured the realization that rapidly growing world markets provide opportunities as well as threats.

Consider this:

In the next five years, countries outside North America will add about 125 million tons of steel capacity. India will raise her steelmaking capacity from 3 million to 11 million tons, Mexico from 1.7 million to 3.6 million tons. Argentina, which has had practically no steelmaking facilities, will gain a capacity about equal to that of U. S. Steel's Fairless Works. Many other countries will blossom out with their first steel producing plants.

Steel is produced for consumption. It is the basic raw material of the metalworking industries. Those countries starting to expand their steelmaking potential soon will start to expand their metalworking industries. Rapid expansion is already underway in some countries.

They will need the tools of metalworking. They will become markets for machine tools, conveyors, heat treating equipment.

Most of the new steelmakers will be able to produce only a limited range of products. They will need sizes and shapes and alloys they do not make. Many will become larger importers of steel mill products and other metals than they are today.

The trade opportunities for industrialized countries making a full range of sizes is obvious.

Capital equipment makers who really design for the needs of those developing countries can have a heyday.

The publishers of STEEL believe that more U. S. metalworking and metal producing companies will have to participate aggressively in the fast growing world market. It is to help U. S. producers of capital equipment and materials carry their story to potential customers abroad that we are preparing to launch an international edition of STEEL.

Walter J Campbell

EDITOR

If there's a road near you, any steel in a hurry from

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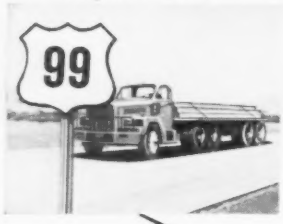

Seattle Service Center
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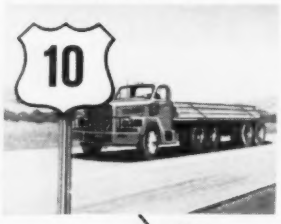
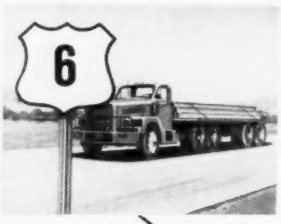


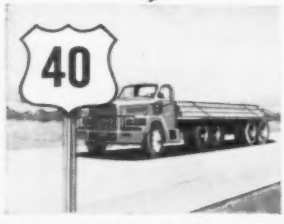
Moline Service Center
Phone 764-5616



Twin Cities Serv. Center
MIdway 6-7311

San Francisco Serv. Center
MA 1-4988 EN 1-0017

Los Angeles Service Center
LUdlow 5-0101



St. Louis Service Center
JEfferson 5-0440

Dallas-Fort Worth Serv. Center
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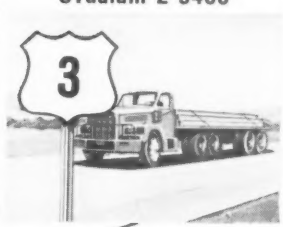

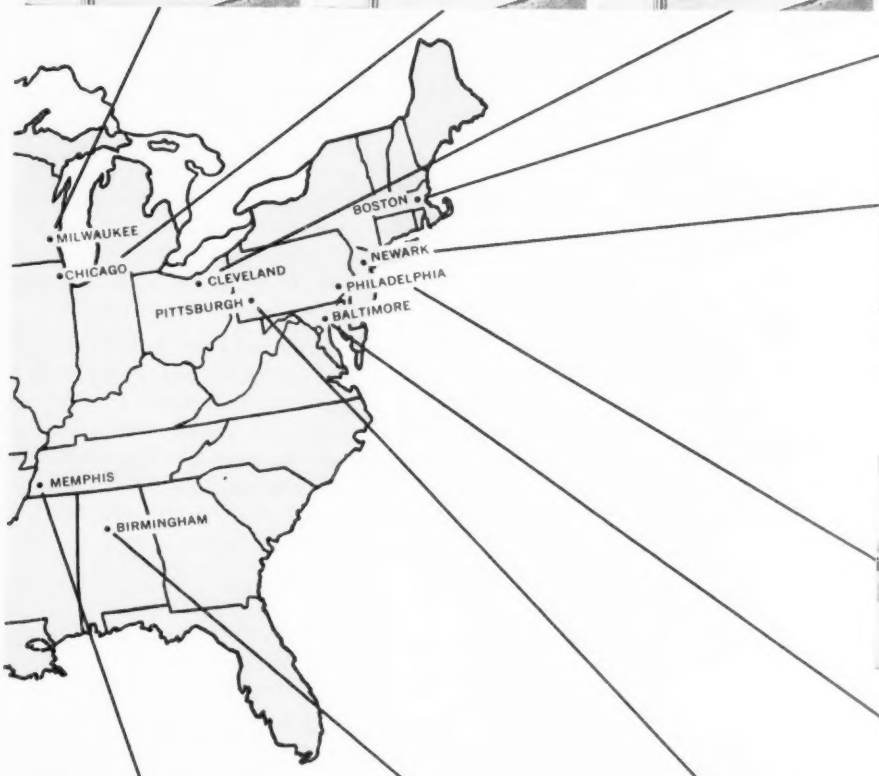

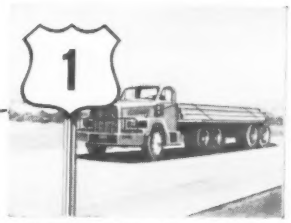

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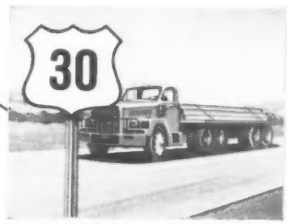

Philadelphia Serv. Center
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Memphis Service Center
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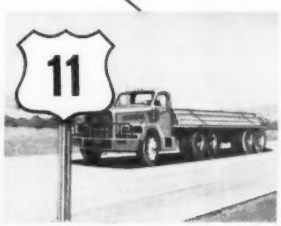
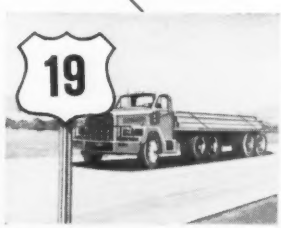


Birmingham Service Center
STate 7-9611



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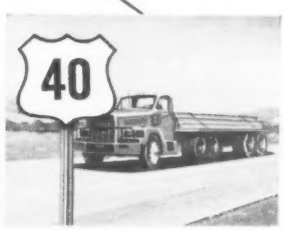

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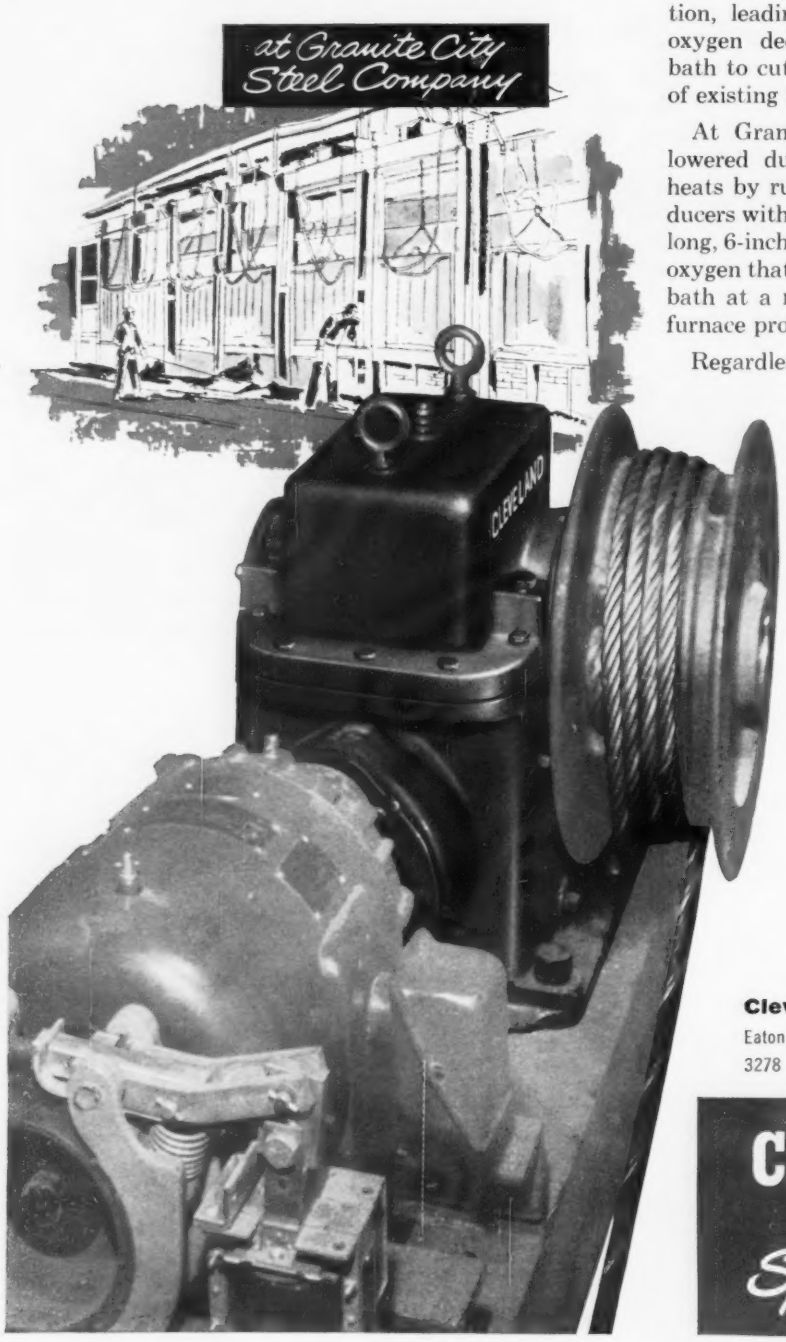
CLEVELAND WORM GEAR SPEED REDUCERS

manipulate lances used in high-production oxygen steel making process...



With today's emphasis on increased production, leading steel producers are turning to oxygen decarburization of the open-hearth bath to cut heat working time—boost output of existing furnaces.

At Granite City, oxygen roof lances are lowered during the working of open-hearth heats by rugged 100AT Cleveland Speed Reducers with helical attachments. These 13-foot long, 6-inch diameter lances deliver high purity oxygen that reduces carbon content of the steel bath at a more rapid rate—greatly increases furnace production.

Regardless of shock or load, where motor power must be transmitted through a right-angle drive, smoothly, efficiently, and without interruption, Clevelands are the answer. Look around the next time you're in a steel plant and note how many of these versatile drives are in use.

Why not write today for your free copy of our most recent illustrated literature that shows the latest developments in the field of worm gearing. Or better yet, contact your nearest Cleveland representative and get the complete facts.

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Worm Gear
Speed Reducers

Senator Byrd and His Senate Finance Committee Take Next Crack at Investment Incentive Plan

- **Company can take tax credit equal to 8 per cent of the amount spent for new equipment with a service life of six years or more.**
- **Spending up to $50,000 for used equipment can be included.**
- **Credits up to 50 per cent of total tax bill can be obtained (for small business exceptions, see text below).**
- **Public utilities are barred from the benefits except spending for natural gas pipelines.**

New Tax Credit Plan Wins First Test

A NEW TAX CREDIT plan being written by the House Ways & Means Committee could save industry $1.2 billion a year. It's a victory for proponents of tax sanity, believe most nongovernment experts STEEL checked.

Even though it is not—and is not intended to be—full depreciation reform, they urge industry's support because it's the best that can be obtained now. Support is needed. Look for Sen. Harry F. Byrd (D., Va.), chairman of the Finance Committee, to oppose the plan.

• **Surrey Plan Changed** — The tentative proposal agreed to by the House Ways & Means Committee last week (see above) is drastically different from the original $1.7 billion proposal of Stanley Surrey, assistant secretary of the treasury. When the language becomes final, emphasis will be upon modernization of U. S. plants, rather than on expansion of facilities, which opponents claimed the original plan would have fostered. The lack of reference to past depreciation practices is designed to answer charges of undue complexity.

Still up in the air is a provision to help small business: Language originally proposed, and endorsed by Treasury, said taxes couldn't be cut by more than 50 per cent in one year, except that the limitation wouldn't apply to the first $100,000 of tax liability. It's now understood that the $100,000 floor could conceivably refer to new investment when the final wording is settled. If so, the 50 per cent limit wouldn't apply to the first $100,000 spent for new equipment.

The final draft may change another point: Present language provides that the credit can be applied only in the tax year in which the new investment becomes part of the depreciation base. That would slow the effect of the credit on spending spread over more than one year. Final wording might allow

the credit in the year when the money is spent.

• **Urge Passage**—Secretary of Commerce Luther Hodges urges business groups to accept the incentive this year and shelve real depreciation reform for now. The U. S. Chamber of Commerce, Electronic Industries Association, and the National Coal Association echo his stand. New York Tax Expert Maurice Peloubet told STEEL: "The revised plan is a sound piece of work."

An O.K. by Ways & Means is tantamount to passage by the whole House, probably by mid-August.

• **Will Senate Agree?**—Look for the Senate Finance Committee to consider the tax credit plan in this session but not act on it even if Congress doesn't adjourn until a week or two after Labor Day. That means the program would have to wait for Senate action until January, 1962, at the earliest. The House approval would carry over to next year.

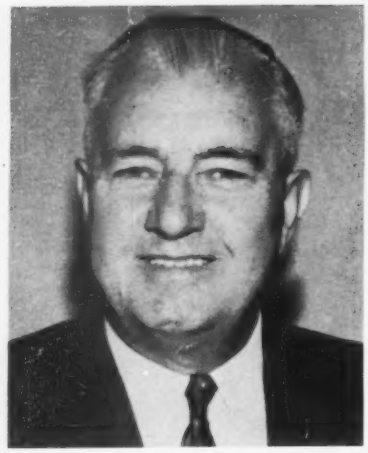
Senator Byrd's basic dislike of proposals to use the tax system for purposes other than to obtain revenue can be counted on to insure thorough hearings by the Finance Committee. Even though other members may eventually vote for the plan, they also want it studied in open session.

Sen. Vance Harke (D., Ind.) of the committee told STEEL the Ways & Means plan is "in the right direction." But he still favors reinvestment depreciation, one form of full reform. Another member, Sen. George Smathers (D., Fla.), still prefers the five-year writeoff approach.

Another possible roadblock to passage in the upper house this year: Sen. Winston Prouty (R., Vt.) is urging the Senate Small Business Committee to hold hearings on the plan's small business aspects.

If these men hammer out an early settlement, here's how . . .

AMC-UAW Pact Could Affect Auto Talks



NORMAN R. MATTHEWS
UAW Vice President

Genial at home and tough at the bargaining table, 65 year old Norm Matthews has been active in top union circles since 1937. He oversees bargaining at Chrysler, American Motors, Studebaker-Packard, Budd, Eaton, and Bendix. British born Matthews also shoots near par golf. He's generally considered an old guard conservative in the UAW.

EDWARD L. CUSHMAN
AMC Vice President

Addicted to long cigars and longer sentences, Ed Cushman joined AMC when it was founded in 1954. Well known as a national arbitrator and industrial relations professor, Ed Cushman at 47 has a labor relations history dating back to college days. He's known for his knack of coming up with clever solutions to knotty bargaining problems.

EVEN IF American Motors Corp. does sign its labor contract early, it won't be a pattern setter as Norman Matthews, United Auto Workers vice president, has implied. The company isn't big enough to establish a formula that the Big Three can follow. AMC has only 23,300 hourly workers compared with 522,000 at Ford, GM, and Chrysler. It holds only 6 per cent of the market.

More important, its typical base hourly wage rate is $2.50, about 5 to 11 cents less than GM. (Those are UAW figures.) Even though the union granted AMC below pattern settlements in 1955 and 1958 when it was on the rocks, the company isn't about to go for any contract that would bring its labor costs into line with those at Ford and GM.

• **Can Pose Threat**—But an early settlement between AMC and the UAW could place strong pressures on the other automakers:

1. Federal officials would be in a better position to say in effect: "AMC settled, now why can't the rest of you sign a contract before we step into the act." None of the Big Three wants government inter-

ference in contract talks.

2. While the rest of the industry still putters over pact signing, AMC would be in a position to get an early jump on the 1962 market with an ideal sales pitch (Rambler favors the workingman).

3. AMC could come up with some fringe concept like profit sharing, salaries for hourly workers, or greatly extended supplemental unemployment benefits (SUB) that would be costly for the other companies to emulate. Yet they'd be hard put to come up with an acceptable reason for ignoring it.

• **Early Pact Likely**—Chances for an early settlement between AMC and the union appear better than 60/40. Edward L. Cushman, company vice president who oversees bargaining, has emphasized that his firm will go it alone this year and that it will sign a contract as soon as it can work out what it wants.

Mr. Cushman has already made two proposals that are near and dear to Walter Reuther's heart. He has suggested a joint standing committee to consider problems outside the contract area, such as education, housing, medical care, recreation, and community needs. Another proposal delves into what AMC calls "career employment planning" so "the individual, insofar as possible, can look forward to regular employment and the expectation of adequate training for promotions, changed assignments, fair wages, and good working conditions." Some observers think that means AMC might go for the union's demand to put hourly workers on salary, although Mr. Cushman earlier told STEEL that he couldn't see such a concept this year.

Don't discount the fact that George Romney, AMC president, believes strongly that all those who contribute to a firm's success are entitled to share in the rewards. His attitude has led many to believe that AMC might be the first to spring some type of profit sharing plan for hourly workers on the industry. It has already offered a payroll withholding program so workers can invest in stocks of their choosing (STEEL, July 7, 1958, p. 40).

Another possibility is that AMC will be inclined to lengthen and increase SUBenefits.

Lone Star, USW Sign Pact

AFTER MORE than two years of negotiations over work rules, Lone Star Steel Co., Dallas, and the United Steelworkers of America reached agreement. The new labor contract became effective July 11 and extends to Sept. 7, 1965.

Settlement came after workers voted in a secret ballot. Less than half the 3300 workers in the bargaining unit voted—1036 voted to accept the proposals, 651 to turn them down.

"The new contract is virtually the same as that proposed two years ago," says Howard Jensen, Lone Star vice president-general counsel, who headed the bargaining team. "The issues did not involve rates of pay or money items, since the company has been paying the same rates as the rest of the steel industry." (The employees have been working without a contract since September, 1959.)

• **Wage Re-opener**—When the Big Steel negotiations are settled next year, Lone Star has the option of granting its workers any wage and benefit increases won by the USW, or reopening the contract for wage negotiations on its own.

The two year dispute centered on work rule changes which the company felt were necessary to increase operating efficiency and strengthen management's right to manage. Here are some of the key points in the contract.

• **Production Changes** — The company has the right to adopt or change production processes—and the right to contract work to outside firms.

• **Work Assignment**—Job descriptions shall not limit the company's right to assign work. Management also determines whether it is necessary to fill a temporary vacancy, as well as choose the worker.

• **Layoff Pool**—As vacancies occur, a worker can go into another department. In the new contract, the company has greater discretion in the selection of the worker—and if the employee refuses the job offered, he becomes ineligible for supplemental unemployment benefits or state unemployment compensation.

• **Incentives, Overtime**—The company has greater discretion in handling incentives and overtime than it did in the previous contract.

• **Union Dues Checkoff** — Employees must sign a new checkoff authorization card. In the new contract, the employee may revoke the checkoff by giving notice (30 days) to only the company.

• **No-Strike Clause** — Provisions limit an arbitrator's power to rule only on whether the worker commits an infraction. The arbitrator cannot rule on the penalty handed down by the company, which was possible under the previous contract.

Mechanized Fettling Unit Saves Time

ELECTRIC furnaces can be fettled faster and cheaper when steelmakers mechanize the job.

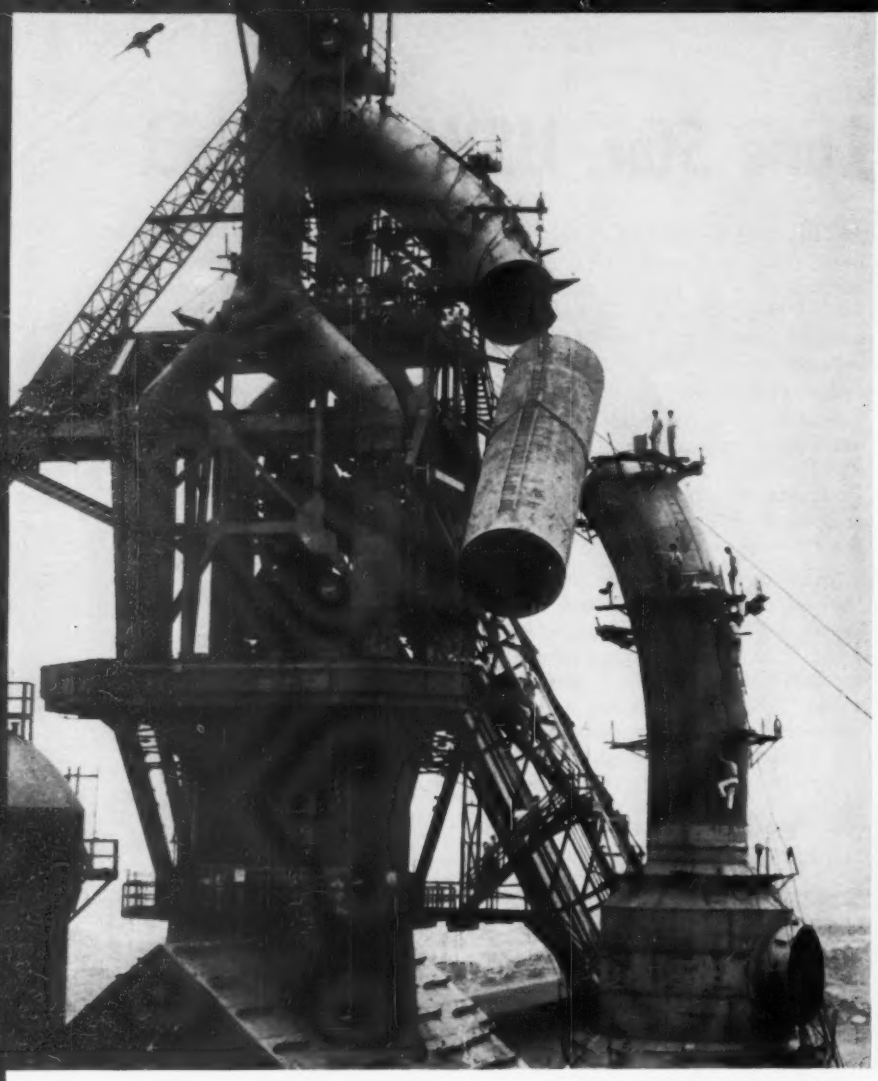
At the Krupp Works in Germany and at a major steel plant in the U. S., refractory material is being spun against the inner walls of furnaces by a fettling machine—the product of Blaw-Knox Co.'s Equipment Div., Blawnox, Pa.

It's a cone shaped hopper about 5 ft high with a diameter of 42 in. at the top and 24 in. at the bottom. Mounted above the top is a variable speed, air motor attached to a shaft that spins a throwing rotor at the bottom.

Lowered by crane into a top charged furnace, the machine spins refractory material around the sides, rebuilding eroded areas at the slag line and below it.

A U. S. steelmaker used the machine extensively in a 16 ft, 75 ton furnace, reported important savings.

Downtime was reduced by 90 per cent. Fettling that took 20 minutes by previous methods required only 2 minutes by machine.



Steel plant expansion in India

Kaiser Engineers Div. of Henry J. Kaiser Co.

Metalworking in China

World growth in steel capacity opens . . .

New Frontiers in Metalworking

MANY new metalworking markets are opening up outside North America.

You can see the evidence in the table of projected capacities (at right) for steel industries of Latin America, Europe, Africa, the Middle East, the Far East, and Oceania.

The capacity of those areas is expected to be 45.9 per cent larger in 1965 than production was in 1960—and most of their mills were operating at full capacity then. If the goal is reached, those countries will have 402,500,000 net tons of ingot capacity. That would be 2½ times the 160 million tons planned for the U. S. in 1965. Adding Canada's 1965 planned capacity of 9.9 million tons, world ingot capacity that year would be 572,400,000 net tons.

• **Money Is a Key**—The extent of the expansion depends to a considerable extent on the success nations outside the Northern Hemisphere have in financing their proposed projects.

World steel production and consumption will continue to climb and by 1972-75 it will be around 695 million net tons, a study by the United Nations Economic Commission for Europe shows.

• **Markets in Mills**—The start of steel production in some countries and expansions in others will neces-

sitate the building of plants and the installation of equipment. Such activities mean markets for buildings, furnaces, rolling and finishing mills, and all the other equipment and tools needed to run a steel mill.

• **Markets for Materials** — Those plants will also require a never ending supply of raw materials. They will be markets for iron ore, alloying material, coal and coke, and limestone and other fluxes.

• **Markets Among Consumers**—The steel produced by the new facilities will have to be machined, processed, and fabricated. Such work will open up markets for machine tools, heat treating equipment, and all the other equipment used by metal consuming plants.

Several factors will determine who cashes in on those markets. Among them: Who makes what the new customers need; the aggressiveness with which the markets are sought; and the kind and extent of financing that can be worked out.

• **Trade Trends**—Despite the expected growth in production, many of the countries that have traditionally imported steel will continue to do so, although their imports will probably shrink in relation to their consumption. Latin America, for instance, now imports half its steel needs (imports are equivalent to 4.5 million tons of ingots). But by 1975, one estimate shows, Latin America will import about that tonnage but it will represent only 16 per cent of consumption.

While exports of the traditional exporting countries will grow tonnagewise, they will decline in relation to production.

Conclusion: World trade in steel will increase at a lower rate than production and consumption.

• **Possibility**—Dangerous surpluses may be thrown onto the world market if for political, social, and economic reasons production plans and programs are developed at a faster rate than projected consumption, or if demand in one or more countries drops considerably below capacity.

The urge to become a steel producer is becoming increasingly

How World Steel Capacity Is Growing

Countries	Planned Capacity 1965 (Thousands of net tons)	Production 1960 (Thousands of net tons)	How much 1965 planned capacity will exceed 1960 output: Thousands of Net Tons	Percentage
LATIN AMERICA	**13,040**	**5,138**	**7,902**	**153.8**
Argentina	2,200	276	1,924	697.1
Brazil	4,400	2,300	2,100	91.3
Chile	770	494	276	55.9
Colombia	330	174	156	89.7
Cuba	150	30	120	400.0
Mexico	3,600	1,760	1,840	104.5
Peru	550	45	505	1,122.2
Venezuela	850	22	828	3,763.6
Others	190	37	153	413.5
EUROPE	**288,629**	**214,555**	**74,074**	**34.5**
Western Europe	**155,096**	**119,749**	**35,347**	**29.5**
ECSC	**98,876**	**80,258**	**18,618**	**23.2**
Belgium-Luxembourg	15,936	12,411	3,525	28.4
France	25,300	19,062	6,238	32.7
Saar	4,290	4,079	211	5.1
West Germany	37,400	33,516	3,884	11.6
Italy	13,200	9,053	4,147	45.8
Netherlands	2,750	2,137	613	28.7
Other Western Europe	**56,220**	**39,491**	**16,729**	**42.4**
Austria	3,520	3,484	36	1.0
Denmark	385	350	35	10.0
Ireland	90	45	45	100.0
Finland	660	283	377	133.2
Greece	165	66	99	150.0
Norway	880	528	352	66.7
Portugal	440	...	440	.....
Spain	4,390	2,068	2,322	112.3
Sweden	4,620	3,545	1,075	30.3
Switzerland	440	310	130	41.9
United Kingdom	38,100	27,222	10,878	40.0
Yugoslavia	2,530	1,590	940	59.1
Eastern Europe (Red Bloc)	**133,533**	**94,806**	**38,727**	**40.8**
Bulgaria	1,266	276	990	358.7
Czechoslovakia	10,395	7,465	2,930	39.2
East Germany	5,725	3,671	2,054	56.0
Hungary	2,200	2,077	123	5.9
Poland	10,000	7,367	2,633	35.7
Rumania	3,637	1,991	1,646	82.7
U.S.S.R.	100,310	71,959	28,351	39.4
AFRICA	**4,665**	**2,433**	**2,232**	**91.7**
Rhodesia and Nyasaland	220	88	132	150.0
Union of South Africa	3,960	2,328	1,632	70.1
Others	485	17	468	2,752.9
MIDDLE EAST	**2,376**	**477**	**1,899**	**398.1**
Egypt	550	110	440	400.0
Iran	330	...	330	.....
Iraq	66	...	66	.....
Israel	330	77	253	328.6
Turkey	1,100	290	810	279.3
FAR EAST	**47,263**	**28,035**	**19,228**	**68.6**
India	11,000	3,430	7,570	220.7
Japan	35,000	24,404	10,596	43.4
Pakistan	330	13	317	2,438.5
South Korea	110	22	88	400.0
Taiwan	440	132	308	233.3
Others	383	34	349	1,026.5
FAR EAST (Red Bloc)	**40,507**	**21,042**	**19,465**	**92.5**
China	39,131	20,337	18,794	92.4
North Korea	1,376	705	671	95.2
OCEANIA	**6,020**	**4,182**	**1,833**	**43.9**
Australia	5,500	4,127	1,373	33.3
Philippines	465	55	410	745.5
New Zealand	55	...	55	.....
TOTAL OUTSIDE U. S. AND CANADA	**402,500**	**275,862**	**126,638**	**45.9**
NORTH AMERICA	**169,900**			
United States	160,000			
Canada	9,900			
TOTAL WORLD	**572,400**			

Source: U. S. Steel Export Co. and American Iron & Steel Institute.

TOP TEN COUNTRIES IN STEELMAKING BY 1965

(Thousands of net tons of capacity)

1.	United States	160,000
2.	Russia	100,310
3.	China	39,131
4.	United Kingdom	38,100
5.	West Germany	37,400
6.	Japan	35,000
7.	France	25,300
8.	Belgium-Luxembourg	15,936
9.	Italy	13,200
10.	India	11,000

Source: U. S. Steel Export Co., and American Iron & Steel Institute.

widespread among all countries, regardless of their size or their economic development. And the expansion of steelmaking facilities is being planned or is underway in practically all steel producing countries.

So while some of the established steelmaking countries like the United Kingdom, Sweden, and West Germany will be adding to their capacities, countries like Venezuela, Peru, and the Philippines will be virtually making their entry into the business.

• **Watch These**—Among the countries to watch are Argentina, Brazil, Mexico, Spain, South Africa, India, China, and Australia.

In 1961 alone, $5 billion to $6 billion may be spent in the worldwide move to keep pace or to gain a place in iron and steelmaking. The amount scheduled to be spent in 1960 was $4.5 billion to $5 billion.

• **Slowdown in Russia** — Of the 1961 amount, $1.2 billion will be spent in the U. S. Russia's estimated outlay will be around $1 billion, about the same as it was in 1960. Russia says it plans to slow its iron and steel production program between 1962 and 1965 so that money can be diverted to the development of agriculture and light industry.

Great Britain and the European Coal & Steel Community (ECSC) are expected to invest about $1.1 billion on steel plants this year.

Japan will spend around $750 million, while Austria, Canada, and India will spend a total of nearly $500 million.

Expenditures of other producers in Europe, Latin America, Asia, Africa, Australia, Red China, and elsewhere are expected to range from $500 million to $1 billion (total) this year.

Over the next few years, the ECSC countries alone are talking about spending $900 million for rolling mills and $650 million for oxygen converters, blast furnaces, and sintering facilities.

• **Limited Start**—Countries new in steel production will at first make only a limited range of products. Anything they need outside that range will have to be imported.

It's reasonable to expect, though, that as these countries increase their capacities they will be able to broaden their range of products rather rapidly. They will have the benefit of the technology and experience accumulated over many years in countries such as the U. S., Germany, and the United Kingdom.

• **Saving Foreign Exchange**—While some of the output from the new steel capacity will find its way into export markets, including the U. S., a big share of the metal will remain in the countries of origin. Many countries that want steel lack the money to buy it from other nations. The have-not countries where labor costs are low can make their money go farther by purchasing iron ore and other raw materials and producing their own steel. Such countries can't borrow money to pay for all their steel needs, but they can borrow funds to build plants to make steel.

• **India Drives Ahead**—India is an example of a country that is doing something to reduce the drain that steel importing has been placing on its foreign exchange. (Imports filled nearly half of its steel requirements in the 1955-59 period.) India felt it had to drastically reduce its expenditures for imported steel so it could conserve foreign exchange to buy materials and goods which, unlike steel, could not be produced there.

India, one of the world's largest potential markets, has the lowest per capita steel consumption of any of the major countries. It is less than 20 lb per person (see chart on Page 59).

To develop a steel industry, India has embarked on a series of five year plans. The second ended on Mar. 31, 1961, and the third will extend from 1961 to 1966. The comprehensive plans cover the entire Indian economy and provide the basis for development programs for both light and heavy industry.

• **India's Goals** — The target for steel ingot capacity under the second five year plan was 6.6 million tons by 1961. The third plan calls for 11 million tons in 1966. That would give India the tenth largest steel capacity in the world (see table at left).

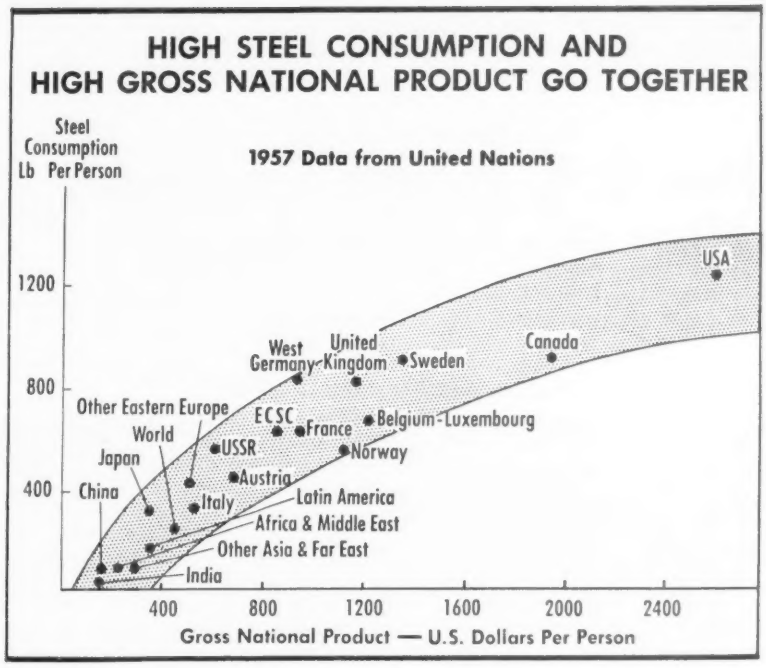
The country is well endowed with raw materials to support its steel expansion. Proved reserves of iron ore amount to 24 billion tons. More than 20 billion tons have an iron content of 60 per cent. One study shows that India has more tons of iron ore reserves than any other country. Its metallurgical coal reserves of 2.25 billion tons are considered adequate to sustain the planned steel production.

• **Expansion in Japan**—Japan's Big Six steel companies are aiming to make half again as much steel in 1965 as they did in 1960 and a little more than twice as much in 1970 as in 1960. Japan has a low annual per capita consumption of steel, and producers there hope to raise it by 1970, or earlier, to the U. S. level. (The U. S. yearly average in 1955-59 was around 925 lb of finished steel.)

Latin America is expected to multiply its steelmaking capacity by 2½ times in the next four years. The bulk of the expansion will be in the four biggest steel consuming countries — Brazil, Argentina, Mexico, Venezuela. Consumption in Latin America in 1959 was equivalent to about 9 million tons of ingots, or 96 lb per capita. Only half the tonnage was produced there.

• **Venezuela Starts** — Venezuela, a supplier of iron ore to the U. S., is one of the countries entering the steel producing business. The Orinoco steel plant is under construction at Matanza, about 300 miles southeast of the capital city of Caracas. It will use Venezuelan high grade iron ore.

When the first stage of the Orinoco plant is completed in 1963, its ingot capacity will be around 825,000 net tons. Finished products will include reinforcing bars, structural sections, rails, wire, and cast iron pipe, and it will have an annual capacity for 330,000 to 550,000 net tons of seamless tubing. Much of the seamless tubular goods capacity will be for supplying Venezuela's oil field needs and conserving the country's foreign exchange. The Orinoco plant has been under construction since 1957. Initial portions of it—the seamless tube mill and the wire drawing plant—will go into operation in 1961. They will use imported semifinished steel until the plant starts making semifinished.



Source: *Steel Facts.*

• **Electric Smelters** — The Orinoco plant will use nine electric smelting furnaces instead of conventional blast furnaces to reduce iron ore to pig iron. Electric power for these furnaces and the rest of the plant will be supplied by a nearby, government owned hydroelectric facility.

Argentina, another Latin American country with little steel production now, is second only to Brazil as a steel consumer.

While another Latin American country, Chile, does not plan as large a steel expansion as some of its neighbors, its rate of growth in the basic metal producing industries and in metal consuming plants is expected to exceed the increase in the country's gross national product (GNP). It aims at a yearly increase of 5.5 per cent in its GNP. Expected annual rates of growth are 7.8 per cent in the basic metal producing industries and 9.2 per cent for industries making various kinds of metal products, machinery, electrical equipment, and transportation equipment.

• **Growth in South Africa**—South Africa has grown from a country dependent on imports to one that can produce three-fourths of its steel requirements and supply many adjacent territories in Africa (and occasionally areas even farther away) with some forms of steel.

The Union of South Africa expanded quite rapidly in the 1950s. The GNP increased at a rate of 4 to 5 per cent a year.

South African steel production is expected to increase at an annual rate of 7 to 9 per cent compared with 7 per cent between 1955 and 1960. This level of production will supply the expected increase in South African consumption and provide for further development of exports.

• **Australia Forges Ahead**—In Australia, an industrial revolution of extraordinary proportions is taking place. New, important industrial projects are being undertaken, and the population and the standard of living are increasing rapidly. Economic growth in the 1960s is expected to be around 4 per cent a year, the rate that prevailed in the 1950s.

Favorable location and high quality raw materials suggest the continued growth of steel production in Australia to supply domestic needs and to provide exports to Asia and the Far East.

Turkey, another country that is expanding its steelmaking capacity, needs more steel than it can make. Purchases of steel from other countries have been severely restricted by shortages of foreign exchange and are no measure of the country's needs. The one integrated Turkish mill produces mainly structural sections, bars, and rails. There is little or no production of flat rolled steel products, but there is a great need for them.

• **Prophecy**—The tremendous size and scope of the world expansion in steel capacity is bound to alter markets. Some of them will shrivel, some will disappear, but many new ones will emerge.

The accompanying rise in living and industrial standards in some of today's underdeveloped countries may eliminate demand for the abacus but build a market for computers.

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How U. S. Foreign Subsidiaries Affect Our Imports, Exports

PROPOSED REVISIONS before the House for taxing U. S. firms on the income of their Canadian and overseas subsidiaries have run into protest from liberal traders. They argue that those subsidiaries contribute much to the economic welfare of the U. S., despite claims from the administration that some companies go abroad to avoid the U. S. 52 per cent corporate tax rate.

Protectionists have added their voices to the demand for more taxation by arguing that the U. S. subsidiaries contribute much to the flood of imports which endanger domestic industries. A confidential survey by the Commerce Department may do something to clear away the oratory and bring the facts into the open.

U. S. Exports to Subsidiaries

(Millions of dollars—1960)

Canada	790
Latin America	594
Western Europe	509
Other Countries	339
Total	2,232

Imports from U. S. Subsidiaries

Canada	243
Latin America	71
Western Europe	96
Other Countries	65
Total	475

● GUDEMAN WANTED THE FACTS — Under Secretary of Commerce Edward Gudeman, a friend of overseas investment, faced tough questioning from some members of the House Ways & Means Committee when he testified in favor of the administration's tax plan. His situation was embarrassing. Reportedly, he doesn't think the Dillon plan to solve the Treasury's revenue problems will provide enough help to offset the bad effects overseas. Investors generally think the nations of the world will enact new rules to counteract the effect of the U. S. taking revenue of companies outside the U. S. Treasury sources admit the additional revenue wouldn't be much more than $100 million.

So Mr. Gudeman ordered a survey of 200 U. S. manufacturing companies with subsidiaries abroad. Responses came in from 155 whose foreign investment accounts for about 80 per cent of all U. S. manufacturing investment abroad. The survey provides first data on imports from U. S. firms abroad.

● INDIRECT EXPORT BENEFITS — The figures shown (see table) represent only the most direct results of foreign operations. If exports developed by foreign subsidiaries on a commission basis are included, U. S. exports attributable to those subsidiaries would be $2,679 million. The less direct exports result from business contacts maintained in foreign countries by our subsidiaries, which can pay off in a number of ways—ranging from formal advice on how to tap new overseas markets to casual contacts with other U. S. firms seeking to expand their overseas sales.

A breakdown of exports attributable to subsidiaries shows manufacturing subsidiaries account for $1,572 million, trading subsidiaries $597 million.

● IMPORTS FELL OFF IN 1960—The relationship between exports and imports attributable to foreign subsidiaries reflects a drop in 1960 imports. A comparison of the 1959 situation would show imports of $592 million compared with direct exports of $1,824 million. From 1959 to 1960, imports from Canada rose $17 million, but these drops were registered: Latin America, $2 million; Western Europe, $116 million; other countries, $16 million.

Automobiles and parts make up more than half of European subsidiary shipments to the U. S.

● GUDEMAN'S CONCLUSIONS — Arguing that foreign investment is beneficial to the U. S. in the long run, Mr. Gudeman wrote the Ways & Means Committee: In 1960, "roughly one-fifth of the 'adjusted' export total was associated with the foreign subsidiaries of manufacturing firms." (He "adjusted" total exports of $18.8 billion to $11.6 billion by excluding foodstuffs, raw materials, and civilian aircraft —items not likely to be exported to the subsidiaries.)

The under secretary also pointed out: About 20 per cent of the materials used by foreign subsidiaries are purchased in the U. S. For example, they bought $129 million worth of capital equipment in the U. S. in 1960. Anticipating some argument against his use of these data, he admits it is tough to prove the U. S. wouldn't have had the exports if it hadn't had the subsidiaries, "because a foreign company rather than a subsidiary might have purchased the same goods."

Other benefits to the U. S. from subsidiary operations, says Mr. Gudeman: About $165 million was paid to domestic U. S. firms by their subsidiaries in 1960 for royalties, license and other fees.

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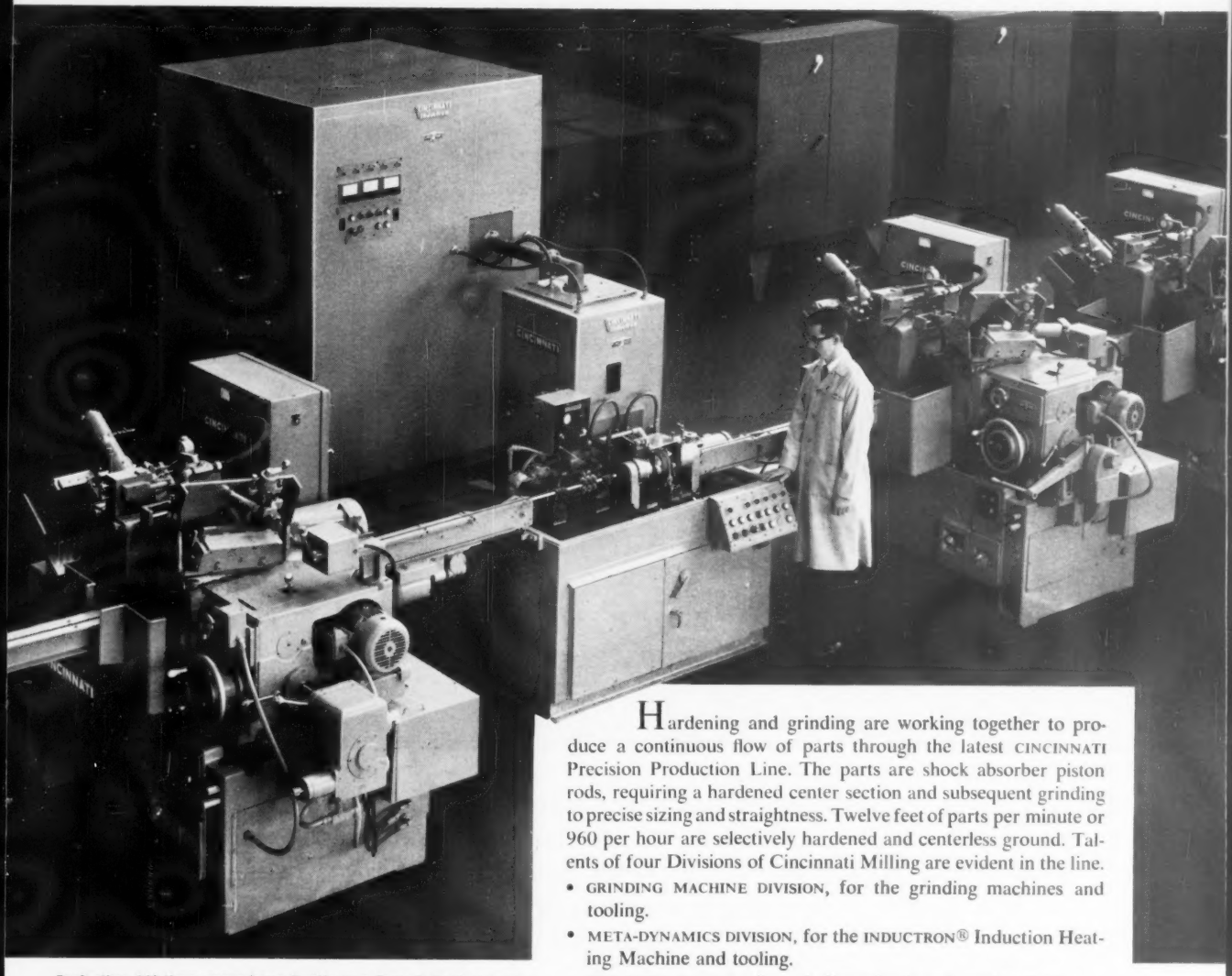

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Seven Latin Nations Effect Free Trade Pact

SEVEN COUNTRIES in Latin America have signed an agreement setting up the Latin American Free Trade Association (LAFTA). The members: Argentina, Brazil, Chile, Mexico, Paraguay, Peru, and Uruguay. Planning to join the group at later dates are: Bolivia, Colombia, Ecuador, and Venezuela.

The seven countries constitute a large potential market: 146 million people (about 75 per cent of the Latin American total). They account for 60 per cent of the area's production of goods and services.

The LAFTA members have agreed to a rather loose association to eliminate within 12 years barriers against products being traded among themselves. A mechanism has also been set up to reduce trade barriers against other products—but each step must be negotiated separately, so the initial impact will be weak. In recent years, items traded among the partners averaged only $300 million a year, less than 10 per cent of the members' total trade. And tariff reductions will have little practical effect. The maze of multiple exchange rates in some nations, export retention taxes, quotas, and other restrictive measures hold down trade much more effectively than do tariffs. Trade and effective competition have been limited, holding back Latin economic development.

Even if negotiations in the years ahead succeed in broadening the scope of trade liberalization, two basic problems still must be faced: 1. Difficult and costly inland transportation. 2. Payment problems.

Despite criticism of certain aspects of the LAFTA pact, the countries involved are beginning to realize that Latin America's economic problems transcend national boundaries.

European Investment Strong

The investment boom, main force in Europe's business expansion last year, is still running strong. Planned expenditures for new plant and equipment suggest that the boom will continue through 1961, reports the Chase Manhattan Bank, New York. Manufacturers in most lines are adding capacity. The prospect of increasing competition with the falling of trade barriers within the Common Market has placed a premium on modernization.

Although Europe's capacity to produce for itself is increasing, most European manufacturers are still operating on long delivery schedules and demand for U. S. industrial equipment remains high. For example, British imports of U. S. machine tools in the first quarter of this year were nearly double the comparable 1960 figure.

Nevertheless, U. S. exporters are facing tougher competition. Lower internal tariffs give an edge to Common Market suppliers. And tariff adjustments, while lowering the duty on U. S. goods entering Italy and France, generally upped the rate on goods bound for Germany and the Benelux countries.

Red Trade Not Promising, Say British

Although there has been an upturn in trade between the Western powers and the Communist Bloc in Europe (population: 300 million), the British government concludes that Eastern Europe is a much less important trading partner than would appear at first glance. The Red governments give priority to intrabloc trade and are seeking to increase self-sufficiency by specialization. For example, Rumania specializes in chemicals, East Germany in machine tools, and Poland in agricultural machinery.

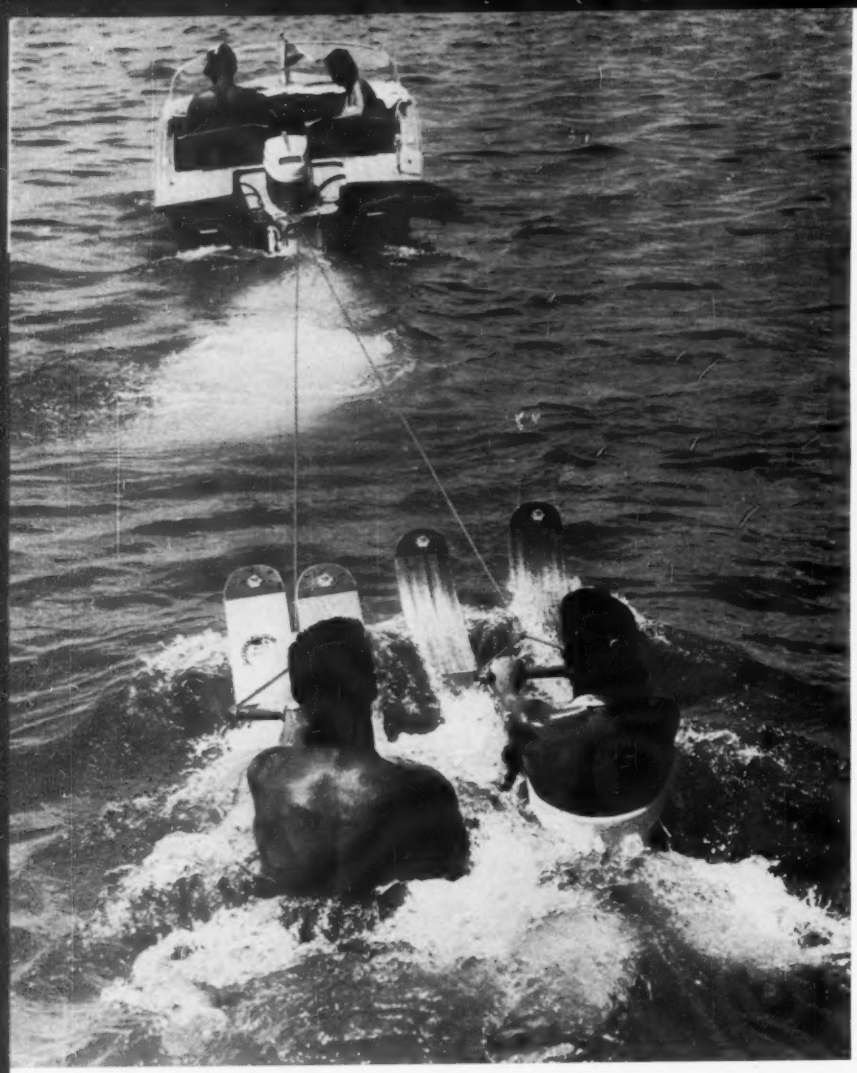
Imports from Western industrial countries are largely restricted to goods not available within the area and reflect the emphasis given in domestic plans to engineering products and basic materials. Purchases of complete plants and the necessary technical know-how have increased substantially, note the British. Imports of consumer goods are small.

Control of foreign trade is entrusted by the central planning authority in each country to a Ministry of Foreign Trade which supervises the trade programs and contract signing.

U. S. Industrial Machinery Exports in 1960

(Millions of dollars)

West Germany	$ 97.0
France	72.2
Italy	70.0
Belgium-Luxembourg	44.4
Holland	43.5
Total Common Market	327.1
United Kingdom	120.7



Potential grows, sales battle gets hotter in the . . .

$20 Billion Leisure Market

AMERICANS spend $20 billion a year for recreation. One-half that amount is spent on participation sports—an area in which metalworkers have a big stake since they supply much of the equipment for recreation.

• **What's Behind It?**—Frank X. White, vice president, American Machine & Foundry Co., New York, says there are economic and social factors behind the boom in participation sports and recreation equipment sales.

Discretionary income has increased sharply in the U. S. since World War II. Recreation has received a fairly steady share (averaging about 13 per cent) of this growing amount. With the U. S. population expanding rapidly, the base of the leisure market is broadening. And as the workweek edges below the 40 hour mark and vacations become more widespread and longer, working people have more time for leisure time activities.

With greater mechanization of factories and more labor saving devices in the home, they have the energy to take part in activities outside their daily work. The growing concern for personal health and trimmer figures and the social status that comes with owning a boat or backyard swimming pool are further causes for the boom. Even television has stimulated interest in such activities as golf and bowling.

• **Fast Game** — The recreation equipment industry has many economic and social forces on its side—but it also has its pitfalls. It is highly competitive and subject to many changes brought about by switches of the public's interest, economic conditions, new materials, new products, and even the weather.

• **Boating**—Last year, 40 million persons made boating a $2.5 billion business through purchases of boats, motors, trailers, fuel, accessories, and services. Until 1954, boating claimed less than $1 billion annually. More than 8 million boats are in use today—twice as many as nine years ago.

Metalworkers have about a 20 per cent share in supplying boat building materials. They have good customers in the motor market which claimed $243 million in retail sales last year and in the $34 million boat trailer market.

Despite an increase in total expenditures last year, production of boats, motors, and trailers took a dip. This partly accounts for the shakeup in boat manufacturers. About 400 firms are in the business and competition is keen. Some firms have begun switching to production of luxury craft which are gaining in popularity and offer a better margin of profit than the smaller boats. Others have merged into larger companies to effect production economies and improve marketing facilities.

Boat enthusiasts are trending toward bigger, faster, more expensive boats. Roamer Steel Boats Div., Holland, Mich., Chris-Craft Corp., indicates its 1962 models will be somewhat bigger and all will incorporate "major styling changes." And in the outboard motor field, average horsepower zoomed from 4.7 in 1947 to 27.4 last year. Evinrude Motors Div., Milwaukee, Outboard Marine Corp., says, "We went from a 30 horsepower maximum in 1956

to a 75 horsepower maximum in 1960."

• **Swimming Pools**—Economic and weather conditions are blamed for the drop in swimming pool construction last year. After hitting a peak of 70,000 units in 1959, pool sales slid to 56,500. The National Swimming Pool Institute predicts a return to the 70,000 mark this year with sales of $850 million. It says, "Many prospective buyers have decided on buying swimming pools and will make purchases this year that were delayed last year."

Only 3 or 4 per cent of the pools constructed last year were metal. Equipment and accessories accounted for much of the metalworking activity aimed at this sport. Nearly all pools sold last year were fitted with filter systems, lights, skimmers, and ladders. And most of them have vacuum cleaners and diving boards. Many have water heaters and fencing. One estimate for accessories, poolside furniture, cleaning apparatus, and chemicals places consumer expenditures in 1960 at $300 million.

• **Social Force** — B. E. Bensinger, president, Brunswick Corp., Chicago, attributes bowling's success to its having become "a great social force as a means of 'togetherness' for the church, for employees, for the teenagers, and for the family." Brunswick and American Machine & Foundry Co. estimate bowling lanes in the U. S. total 125,000. With 27 million bowlers to serve, lanes are more crowded today than they were several years ago, although 25,000 lanes were added in the last year. Americans are spending $450 million to bowl and millions more are spent to construct or remodel lanes. With interest in bowling on the increase and the population expanding, equipment producers foresee continuing expansion of their market. And as equipment wears out, replacement will present a big market. Mr. Bensinger states, "Over the next decade, this market alone represents a vast potential."

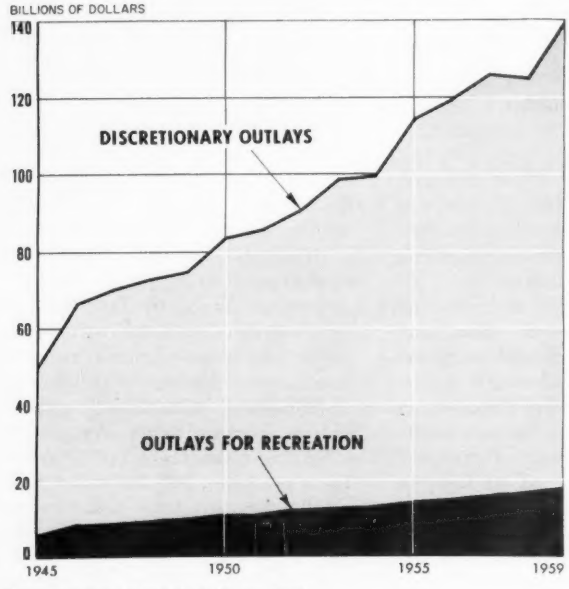
• **Material Changes** — Remington Arms Co. Inc., Bridgeport, Conn., has shown that even an established sport like hunting is open to innovation. With a market of 20 million hunters spending more than $250 million a year for firearms and ammunition, the firearms industry has seen a number of changes in product design, materials, and production methods. Remington has produced a rifle with an aluminum alloy jacket joined to the barrel bore and a stock and trigger guard made of structural nylon. The lightweight weapon is popular with consumers but shows metalworkers that they must be aware of the possible changes in materials that may quickly put them in or out of a recreational equipment field.

Outboard Marine Corp., Waukegan, Ill., has announced the development of two, diecast, aluminum engines which it says are light, vibrationfree, and adaptable for recreational marine use. Demand for light equipment in many sports means manufacturers must be on the lookout for new materials.

Wilson Sporting Goods Co., River Grove, Ill., subsidiary of Wilson & Co. Inc., says that golf is "the one sport in which steel has been a product of manufacture which shows the most progress and possibly the most promise for the next five years." But the company adds that experimentation with glass golf club shafts has been underway for some time. Although glass fiber shafts have not yet caught on with golfers who spend $100,000 a year for equipment, a changeover like that in the fishing rod industry could take place.

• **New Products** — Sportsmen are

Americans Increase Recreational Spending



Source: National Industrial Conference Board.

Sports Participants in the U. S.

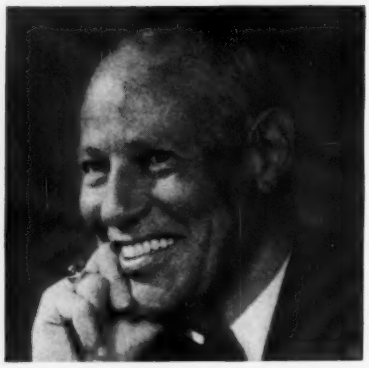
	1946	1959	1965*
Boating ..	20,000,000	37,000,000	45,000,000
Fishing ...	13,100,000	25,620,000	35,000,000
Bowling ..	12,500,000	22,000,000	35,000,000
Hunting ..	9,990,000	18,000,000	20,000,000
Basketball	9,000,000	11,275,000	18,000,000
Baseball .	5,000,000	7,925,000	11,000,000
Softball ..	4,700,000	7,840,000	10,000,000
Tennis ...	4,100,000	6,714,000	8,000,000
Golf	4,300,000	5,400,000	10,000,000
Archery ..	1,700,000	4,725,000	7,000,000
Skiing ...	1,400,000	3,000,000	4,000,000
Football ..	1,500,000	1,780,000	3,000,000

Source: Athletic Institute for 1946 and 1959.
*Estimated.

Overseas Recreation Boom Is Coming

B. E. BENSINGER, president, Brunswick Corp.

"We believe the potential is so great that we have budgeted several millions for development and organization expense as well as capital investments, to establish the base upon which we will build a world-wide business. While all of our product lines are finding strong acceptance abroad, our most profitable prospect for the immediate future is in the bowling field."



FRANK X. WHITE, vice president, American Machine & Foundry Co.

"A virgin territory. We're getting a pattern internationally that is beginning to look similar to that in the U. S. Europeans have had a 48 hour week. Now it's coming down to 40 hours. Europeans buy cars, and the next thing they buy is camping equipment—and they go bowling. Our bowling export business is worth about $50 million and we are just tapping the surface."

always a good market for totally new ideas. The electric-powered golf cart proved to be a successful example of this. Cushman Motor Works Inc., Lincoln, Nebr., subsidiary of Outboard Marine Corp., says, "Two years ago, we felt that this year the market would be leveling off. However, it now appears that we have not even approached the full potential of this market." Cushman introduced two new products for sportsmen last fall —a gasoline-powered golf cart and a motor scooter for hunters and fishermen.

• **Imports** — Bicycle sales in the U. S. have risen in the last decade but, says N. A. Clark, president, Columbia Manufacturing Co. Inc., Westfield, Mass., "the percentage of this market enjoyed by the industry has decreased as foreign bicycles today represent about 35 per cent of the market." W. F. Stoeffhaas, executive vice president, Arnold, Schwinn & Co., Chicago, describes the plight of the industry: "We have found that our overseas competitors copy anything progressive we might do. Anything we can do, they can do cheaper."

The fishing tackle industry has been similarly affected. The Associated Fishing Tackle Manufacturers reports, "The domestic manufacturer can purchase products so much cheaper than he can manufacture them that many of our members have been forced to join the ranks of importers."

• **Promotion** — Camping and picnicking have been enjoyed for a long time but large scale promotion programs and the introduction of a long list of new products have stimulated a sharp increase in their popularity. Coleman Co. Inc., Wichita, Kans., manufacturer of camping equipment, says, "One of the biggest problems involved in serving this market is the education of the public regarding recreation in the great outdoors."

One in 25 U. S. families goes camping each year and metalworkers supply many of the items they use. One of them, the travel trailer, is gaining in popularity. Mobile Home Manufacturers Association, Chicago, estimates 560,000 Americans are using 200,000 travel trailers for vacation trips and weekend outings. Trailer sales jumped from 15,370 units in 1956 to 41,780 units ($75 million) last year and may hit 75,000 by 1965.

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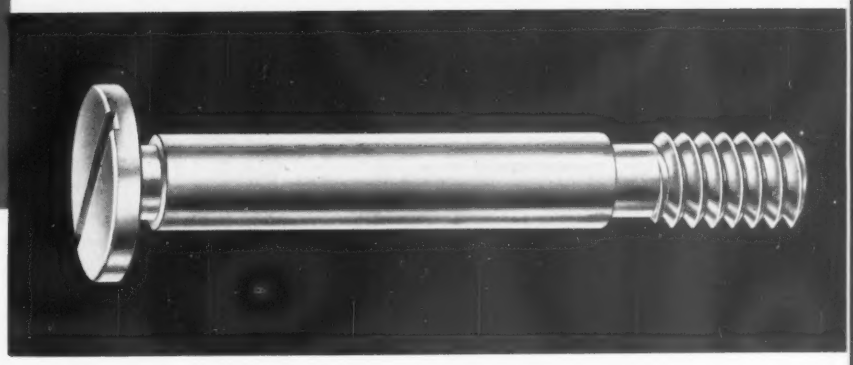

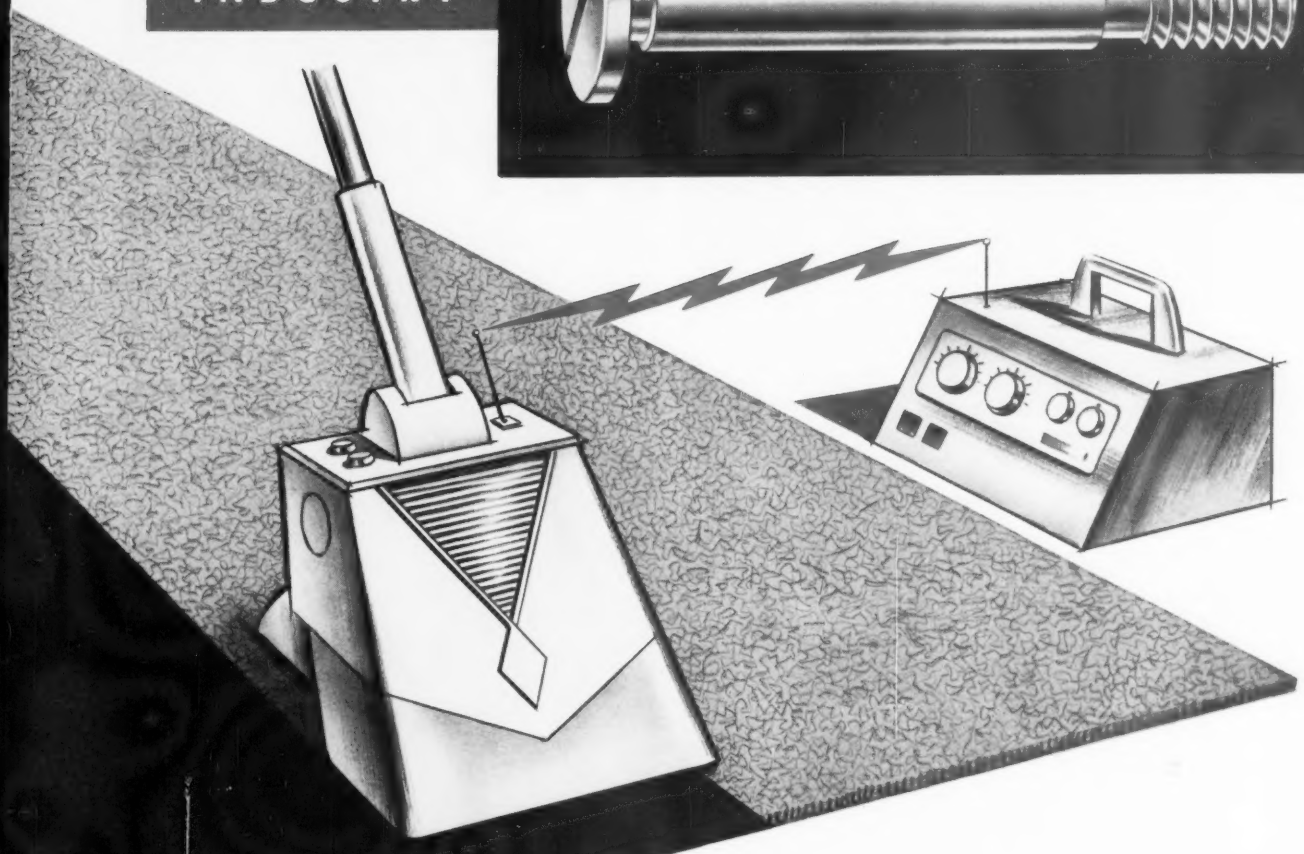

clean sweep for savings

Remote control rug cleaning . . . impossible? We don't think so. In this age of satellites and astronauts we feel that anything can happen and we're betting that it will. Our products, and yours, must reflect the latest and best thinking if we are to continue to compete. This is why many far sighted design engineers are exploring the added savings which result when parts formerly made by the expensive screw machine process are redesigned to run quickly and efficiently on cold headers.

The part shown in the illustration was cold headed to replace a more complex . . . and therefore, more costly . . . screw machine part. If you are seeking ways to produce quality fasteners at less cost and eliminate the material waste and slow production time found in screw machine parts, why not call the man from GLS? Let him show you how we can cold head quality into precision fasteners and give you a *clean sweep for savings.*

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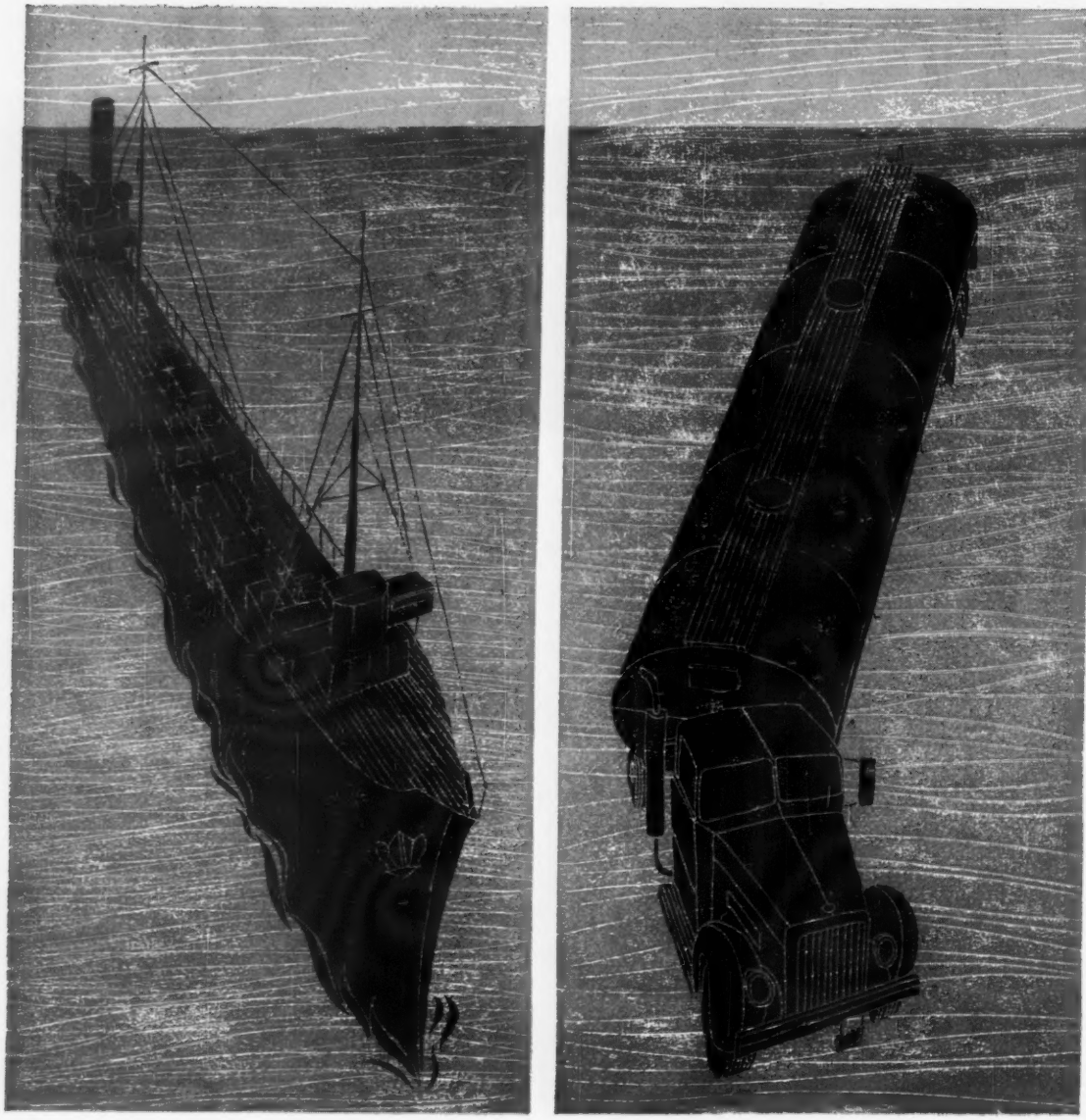

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Autodom's Challenges in the '60s — No. 2

Last week, auto company presidents discussed the broad aspects of the problems facing their industry. Here's how executives concerned with materials view the decade ahead.

Materials Battle Hinges On Cost, Performance

'More Breakthroughs for Light Metals'

ALUMINUM, magnesium, and plastics are not likely to replace steel as the basic automotive ingredient in the foreseeable future, but they will continue to show outstanding gains. Only 13 years ago, the average automobile contained 6 lb of aluminum. Today the average is up to 63 lb.

Instead of selling price, those industries have sold us on possible applications. They have succeeded to an important degree. One striking example is the 60 lb aluminum cylinder block in the 1961 Rambler Classic Six Custom sedan. This block results in a weight saving of 80 lb when compared with a cast iron block.

Thermoplastics are shaving away automotive poundage. The average U. S. car this year has 20 lb of plastics compared with 11 lb only six years ago. Some experts expect this figure to reach 60 lb per car by the end of the 1960s. The weights do not include plastics used in conjunction with other materials such as vinyl upholstery, floor mats, paint, and laminated glass. Those items contain another 30 lb of plastic resins.

While the U. S. plastics industry has made broad advances in the last few years, it still is about two years behind the Europeans. One small foreign car uses 12 lb of plastic parts to replace 84 lb of metal parts.

Ralph H. Isbrandt, vice president, automotive engineering and research, American Motors Corp.

'Cost Is Key to Material Selection'

IT APPEARS that iron and steel will continue to make up the bulk of our construction materials during the decade ahead for two reasons: 1. Iron remains the cheapest of all metals, even when one allows for the weight difference of its principal competitor, aluminum. 2. Its combination of engineering properties still equals or surpasses that of competing nonferrous and organic materials, particularly with respect to load bearing capacity.

An exception is in the corrosion resistance of uncoated steel. Sensitivity to corrosive attrition not only detracts from the long term appearance of the entire product, it becomes of special interest in unitized body construction where thin walled sections are being used to reduce car weights without sacrificing structural strengths. Better protective coatings, metallic and nonmetallic, are helping to correct the problems.

Research in other quarters continues to enhance the dependability and quality of cast iron products, extend the applicability of our pearlitic malleable irons and further reduce the need for expensive alloy steels.

Competition from other materials, especially the light metals and plas-

Lawrence R. Hafstad, vice president, General Motors Research Laboratories

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tics, promises to become even fiercer . . . stimulated as much by rising production costs as by the growing trend toward lower vehicle weights and improved fuel economy.

Lightweight, high performance, aluminum engines have become a production reality, and further improvements in cost and quality are to be expected. Especially significant is the development of high silicon aluminum alloys whose wear resistance is competitive and even surpasses that of some of the ferrous metals. Some major production problems must be resolved before the material can be used.

Magnesium too is certain to find increased usage, particularly for parts where its susceptibility to corrosion presents no problem.

'Lighter Weight Is Needed'

Maurice F. Garwood, chief materials engineer, Chrysler Corp.

WE NOMINATE aluminum and magnesium to show maximum use increase during this decade. Their growth will be in functional and decorative applications since light weight reduces steering effort, improves brake performance, acceleration, and fuel economy.

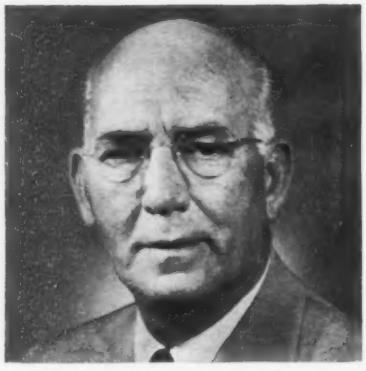
The automotive industry must design to take full advantage of the lightweight material properties and processes. Hot extrusion, roll forming, impact extrusion, and diecasting all lend themselves to precise shaping of metals in a minimum number of operations. (This means) additional cost savings may be obtained through the reduction of machine tools needed to finish components prior to assembly.

To achieve our breakthrough to the optimum vehicle of the future, the continued efforts of the diecasting industry to increase size, reliability, and quantity of castings will be needed. Prime producers of aluminum and magnesium must find high strength and corrosion resistant alloys for functional parts.

Plastics is the other material we would nominate for one of the stars of the decade. Its basic advantages: Light weight, corrosion resistance, decorative and styling appearance.

Body moldings and lamp housings are applications that will contribute to increased use of plastics. Printed circuit use in autos is in its infancy. We visualize entire molded instrument panel structures embodying integral electrical circuits, crash pads, and glove boxes.

'Plastics Will Continue to Grow'



Andrew A. Kucher, vice president, Ford Motor Co.'s engineering and research staff

THE MODERN automobile is a complex machine of more than 13,000 parts . . . so material selection must be carefully considered. It is the cost of the finished part and not the material cost alone that is a major criterion for selection.

As fabrication of plastics is usually simple and inexpensive, these relatively high priced materials can be used to a greater extent than might be anticipated. In 1940, less than 5 lb of plastics were used in the average car. By 1960, usage increased to 25 lb per car. If one extrapolates the rate at which plastics presently are being consumed, an additional twofold increase should be expected through the next ten years. If one computes the price of an "average" plastic, one finds it has decreased about 35 per cent during the last six years, while steel has increased 20 per cent, aluminum 8 per cent. about 20 per cent and aluminum has increased 8 per cent.

The trend in designing plastic parts is to take full advantage of both mechanical properties and physical characteristics to produce a functional as well as practical part. Examples are plastic arm rests, seat side shields, cowl kick panels, dome lights, instrument panel housings, and door handles. Each of those items is designed for the material properties and molding characteristics of the plastic used.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	559,474	613,136
6 Mo. Totals	2,736,719	3,809,494
July		434,377
August		305,514
September		407,691
October		617,972
November		597,638
December		523,422
Total		6,696,108

Week Ended	1961	1960
June 17	129,274	137,641
June 24	128,216	141,247
July 1	125,297	125,868
July 8	85,889	89,769
July 15	127,415†	105,113
July 22	100,000*	112,179

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

sea-going pinions...

alloy steel of course

This small pinion gear operates under man-size loads. A vital part of the gear case assembly for an outboard motor, it must stand up under extreme stresses and strains—yet its size is restricted by compact design. OUTBOARD MARINE CORPORATION* selected Aristoloy 8620—added strength without increasing bulk or weight. They report that this *electric furnace* alloy machines, drills, and broaches easily—yields parts of uniform, smooth finish—and, most important, the strength and hardenability characteristics after heat treatment, which they required.

For more information about Aristoloy bars and billets, call your nearest Copperweld representative—or write today for PRODUCTS and FACILITIES CATALOG.

*Manufacturers of Johnson, Evinrude and Gale Outboard Motors.

ARISTOLOY STEELS

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Sees $4500 annual screw saving

RB&W fastener survey uncovers use of special item which is replaceable by standard hex screw at much less cost

Of course you pay more for a "special" than a "standard" item—and that includes fasteners. So, when surveying a company's usage of fasteners, the RB&W Man looks sharply for the "specials"—and a valid reason for their use.

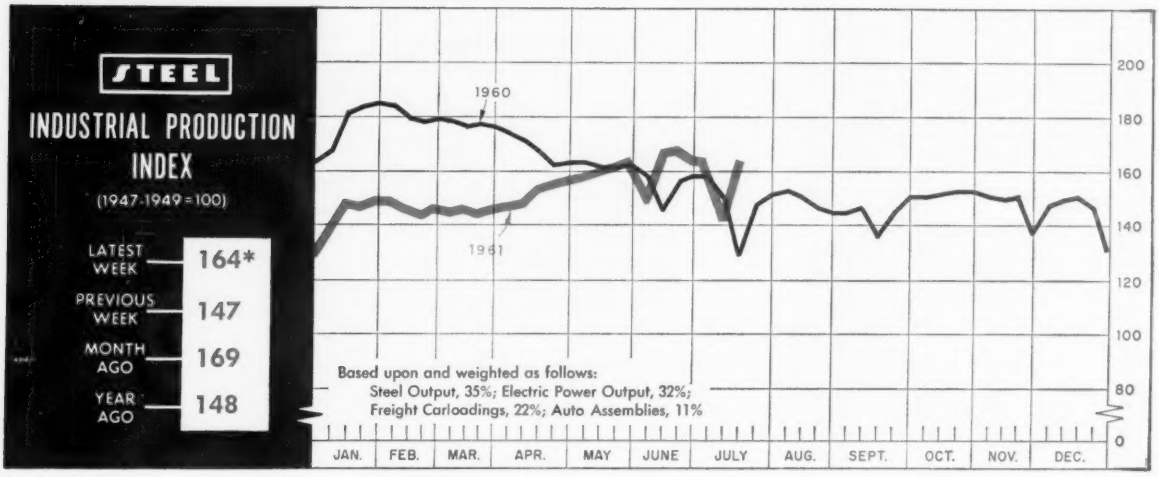
He could find no good purpose for the extensive use of screws with heavy head and milled body in one particular product. There was neither a specification requiring close fit in very close tolerance holes . . . nor were there exceptionally "sloppy" holes that called for an oversize head to span.

He therefore recommended assembly with standard RB&W High Strength Hex Screws. They would meet any physical requirement for the "special" being used... *but cost 30¢ less per unit.* Yearly total: $4500 more for *profits* instead of *costs.*

Are you *sure* you're not needlessly wasting dollars on fastener specifications? Let the RB&W fastener expert survey them. He's made proper fastener usage a science, is ready to cooperate with your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W
117th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.



*Week ended July 15.

Business Approaches Record Level

THIS RECOVERY is running three to six months ahead of schedule. It has the makings of the fastest upturn in postwar history. That could mean trouble in the long run.

About three months ago, STEEL's Panel of Economic Consultants said that the Federal Reserve Board's industrial production index would average 103 per cent of the 1957 base period in the second quarter, 105 per cent in the third, and 108 in the fourth. The opinion of the panelists was so nearly unanimous that several cautioned: "There will be an awful lot of us right on the button, or you'll find that some maverick on the high or low side is smarter—or luckier—than most of us." With the announcement by the FRB that its index hit 110 last month, it is obvious which of the alternatives is correct.

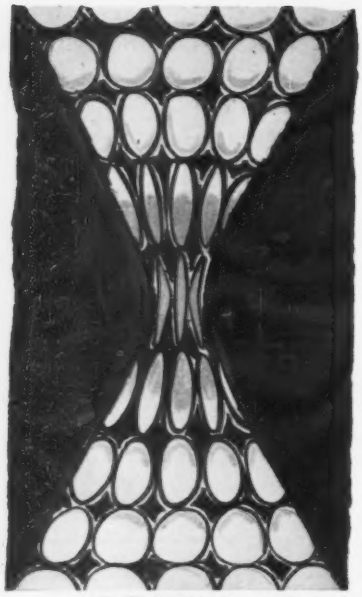
• **How It Compares** — The June reading is just 1 point below the all-time high of 111 set in January, 1960. It exceeded the year-ago mark for the first time since the recession got underway. In just three months, the index has recovered, in effect, all the ground it lost last year. (While the peak was achieved in January following the steel strike, most analysts do not consider the over-all recession started until sometime later—perhaps in August.) After the 1948-49 recession, the trend line took just five months to regain the previous peak, with a big boost from the Korean buildup. After 1953-54, it took 12 months. After 1958-59, it took 10 months.

Continuation of the recovery at such a high rate would be undesirable, declares Dr. John W. Harriman, economist for Tri-Continental Corp., New York closed end investment company. It would "spell a boom, a development which is to be avoided even at the cost of less rapid progress. A boom really connotes a temporary phenomenon which will be succeeded by a bust," he believes. Most postwar recoveries have been characterized by three

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,850[1]	1,860	1,550
Electric Power Distributed (million kw-hr)	15,200[1]	14,133	14,208
Bituminous Coal Output (1000 tons)	1,310[1]	1,860	1,335
Crude Oil Production (daily avg—1000 bbl)	7,000[1]	6,970	6,832
Construction Volume (*ENR*—millions)	$594.6	$379.2	$601.1
Auto, Truck Output—U. S., Canada (*Ward's*)	158,188[1]	110,387	133,665
TRADE			
Freight Carloadings (1000 cars)	550[1]	425	607
Intercity Truck Tonnage (changes from year ago)	−0.6%	+1.7%	−17.7%
Business Failures (Dun & Bradstreet)	220	326	271
Currency in Circulation (millions)[2]	$32,797	$32,480	$32,361
Dept. Store Sales (changes from year ago)[2]	+6%	−1%	−14%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$28,999	$25,863	$26,178
Federal Gross Debt (billions)	$288.8	$289.0	$285.9
Bond Volume, NYSE (millions)	$31.7	$26.8	$23.5
Stocks Sales, NYSE (thousands of shares)	14,845	11,965	12,997
Loans & Investments (billions, adjusted)[3]	$113.3	$113.1	$103.3
U. S. Govt. Obligations Held (billions)[3]	$32.0	$32.0	$25.3
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	224.8	225.0	232.5
All Commodities[6]	119.0	118.9	119.7
Commodities Other than Farm & Foods[6]	127.8	127.7	128.3

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.



BRMCO 3004 STRIP ALUMINUM MATCHES 5052...

SAVES COMPANIES $40.00 A TON

A top electrical equipment manufacturer, wanting to reduce production costs, asked BRMCO and several other leading mills to develop a 3004 strip aluminum to replace the 5052 they were using. Because of a critical forming operation, they required a tensile strength within 37,000-42,000 psi, with a 5% minimum elongation.

BRMCO field engineers, metallurgists and production men attacked this difficult problem, realigned strip production methods and quickly produced a 3004 strip with the required tensile strength and with an elongation factor well above the minimum requirement.

BRMCO now can save all manufacturers $40.00 a ton in strip aluminum costs by supplying them these 5052 characteristics in a lower cost alloy.

This same technical assistance can cut your nonferrous strip costs, increase your production. Write or call today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

BRMCO

Bridgeport Rolling Mills Company
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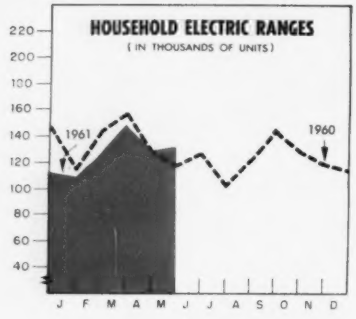
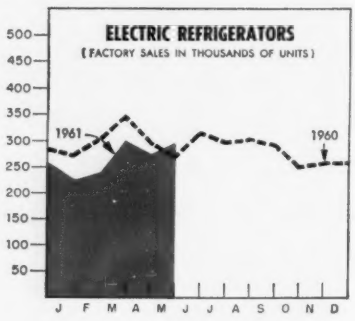
THE BUSINESS TREND





Total Factory Sales—Units

	1961	1960	1959
Jan.	109,400	116,000	120,800
Feb.	128,100	144,500	134,600
Mar.	148,200	157,700	172,600
Apr.	128,400	127,900	136,100
May	131,600	118,500	133,400
June	.....	127,200	151,400
July	.....	102,900	129,200
Aug.	.....	123,400	116,600
Sept.	.....	144,000	157,200
Oct.	.....	129,100	143,400
Nov.	.....	119,400	144,000
Dec.	.....	114,400	147,500
Totals	.....	1,525,000	1,686,800

National Electrical Mfrs. Assn.
Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	225,700	272,100	256,200
Feb.	239,000	308,500	306,200
Mar.	300,000	345,000	333,700
Apr.	273,900	300,000	301,000
May	294,300	273,400	308,200
June	.....	314,700	361,000
July	.....	297,400	370,800
Aug.	.....	307,500	314,100
Sept.	.....	290,700	355,700
Oct.	.....	249,200	329,600
Nov.	.....	258,400	265,900
Dec.	.....	258,100	282,600
Totals	.....	3,475,000	3,785,000

National Electrical Mfrs. Assn.

phases, he points out: 1. A rapid recovery. 2. A period of growth. 3. A plateaulike formation. The changing pace of the up cycle should not be considered a weakness in the economy, he asserts.

• **Leveling Ahead**—"The first phase of the process is evidently drawing to a close, and the course of the economy this summer promises to be relatively flat, followed, however, by a more vigorous autumn with the production index attaining a new all-time high."

But despite the hefty increases in the production indexes and the growing optimism, businessmen are not in a hurry to make predictions which would resemble their "Soaring Sixties" prognostications of only 18 months ago. For instance, the National Association of Credit Management (NACM) foresees a gross national product of only $520 billion (annual rate) by fourth quarter and $535 billion by June 30. (It was $499.8 billion in the first quarter.) It also sees the FRB index reaching 114 (just 4 points away from the June figure) by the end of the year, with a high of 117 by mid-1962.

NACM forecasts other segments of the economy as follows:

• *Disposable Income*—It will climb from the first quarter annual rate of $357.2 billion to $368 billion by yearend, and on to $380 billion by June 30, 1961.

• *Consumer Expenditures*—It will total $347 billion annual rate by Dec. 31, climbing to $360 billion by mid-1962. It was $328.8 in the first quarter.

• *Plant and Equipment*—This type of spending will increase to $34.6 billion annual rate in the third quarter and $35.5 billion in the fourth.

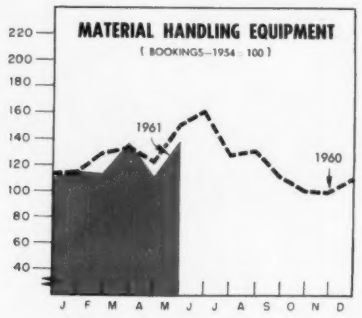
• *Construction*—Spending for work put in place will rise about $2 billion this year.

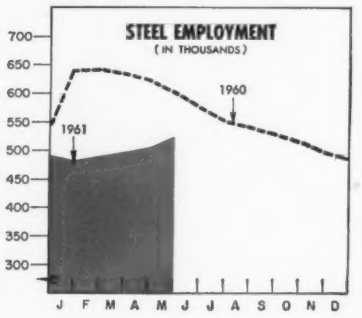
• *Inventory Building*—Look for an $8 billion to $9 billion increase in this important segment.

However, NACM points out that while some industries will participate in the gains, there are some which are still waiting for the first effects of the recovery.

Buyers Confident and Cautious

That the economy is headed for a "slowdown of the upturn" is evident from the reports of purchasing agents in two of the more important metalworking centers—Chicago and Cleveland.





	1961	1960	1959	1958
Jan.	116.24	114.96	115.84	93.07
Feb.	114.39	128.74	124.77	93.49
Mar.	136.96	133.60	146.36	97.89
Apr.	109.85	122.41	147.28	122.36
May	136.47	150.33	164.45	115.04
June	.....	160.23	170.72	131.15
July	.....	126.79	130.26	134.34
Aug.	.....	131.33	87.02	104.46
Sept.	.....	111.11	126.43	85.41
Oct.	.....	99.89	131.09	111.35
Nov.	.....	98.96	124.16	110.88
Dec.	.....	110.00	113.78	105.97
Avg	.....	122.55	131.85	109.87

Material Handling Institute Inc.

	Employment In Thousands		Payroll In Millions	
	1961	1960	1961	1960
Jan.	478	641	$274.9	$398.8
Feb.	484	643	267.1	381.4
Mar.	492	637	298.1	398.8
Apr.	501	626	292.0	357.2
May	519	604	326.2	339.8
June	...	580	....	316.0
July	...	554	....	287.0
Aug.	...	543	....	300.3
Sept.	...	531	....	287.2
Oct.	...	516	....	284.8
Nov.	...	499	....	270.4
Dec.	...	486	....	267.9

American Iron & Steel Institute.

The June report of the Purchasing Agents Association of Chicago shows that in almost all categories, the rapid improvement of April and May began to slack off last month. Buyers were still noting improvement in employment, production, and orders, but the percentages noting "higher" and "same" have not changed significantly. They are still following caution in building their inventories.

In Cleveland, the situation is similar. However, the Purchasing Agents Association of Cleveland Inc. notes that "in spite of the figures of the last four months, which show a substantial rise in business, there is some reluctance in expressing complete optimism to the effect that the recession is over and the trend is up. Members continue to feel that the rising trend will be gradual . . . they are still not confirming the feeling (expressed at the national convention) that 1961 will be a banner year."

Index to Hold Steady

STEEL's industrial production index rebounded about as expected after the July 4 holiday week. It registered a preliminary 164 (1947-49 = 100) for the week ended July 15, a 17 point rise from the 147 registered in the holiday week. (See chart, Page 73.) It is likely that the trend line will fluctuate within the 160-165 range for the next four to six weeks, then climb rapidly to new highs by late September or October.

The main reason for the lack of any new strength in the immediate future is the early shutdown in motordom for 1962 model changeover. Already a large part of General Motors Corp.'s facilities is either down completely or phasing out 1961 production. Chrysler Corp. began easing off last week. Ford Motor Co.'s Louisville plant is closed. By the end of this week, all of GM (and probably Chrysler) will be down. American Motors Corp. is still in full production of 1961 models, and Ford is gradually tapering off. Studebaker-Packard Corp. has been idle since late in June.

The buildup of 1962 production will start with S-P on Aug. 7, followed by Chrysler the next week and GM shortly after. In the meantime, the changeover will take probably 10 points away from STEEL's industrial production index. That will be partially offset by expected gains in output of electricity and railroad freight carloadings.

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* * *

Stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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Cast or forged steel, gray iron, bronze, Mechanite, rawhide or bakelite

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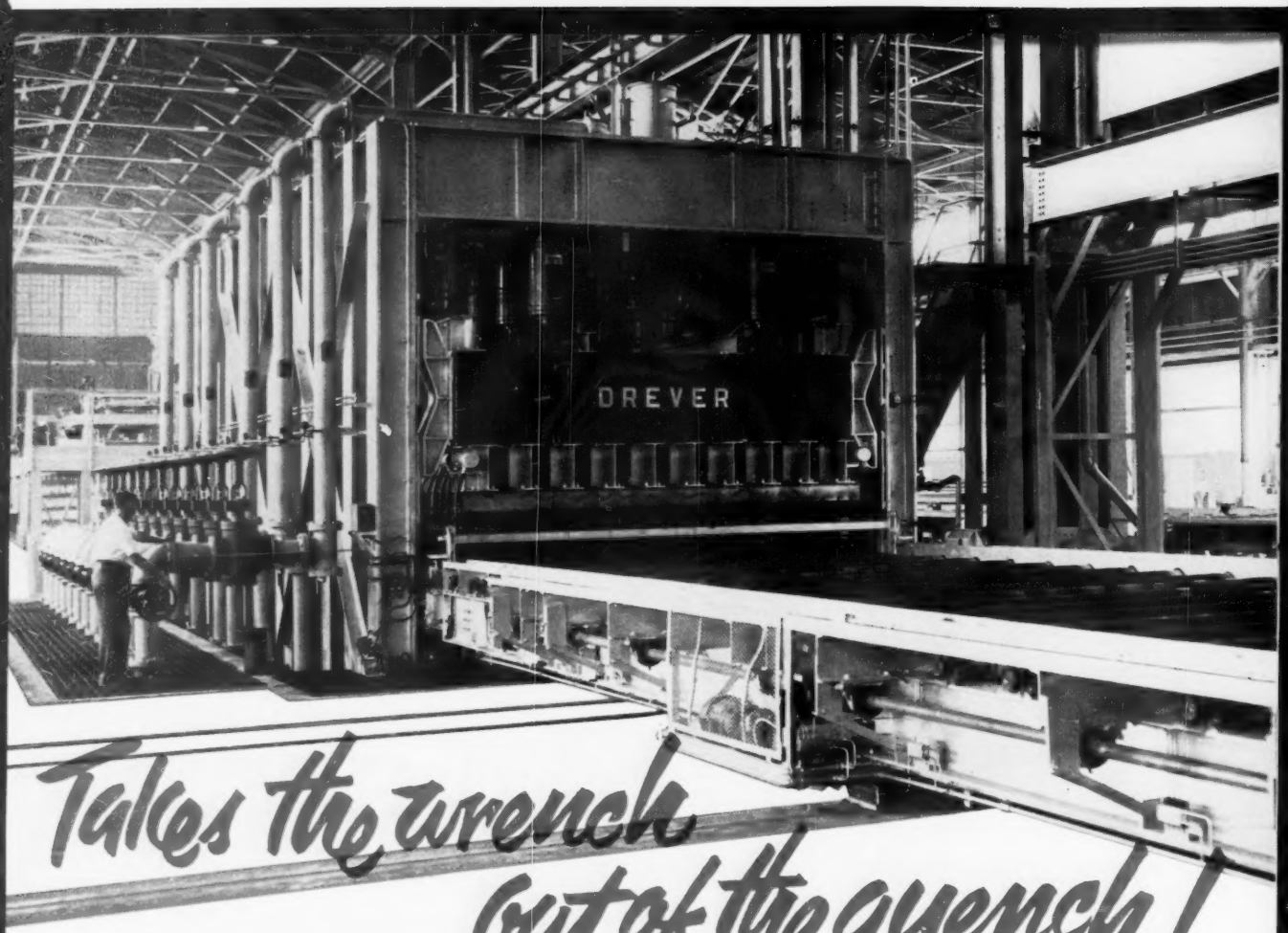
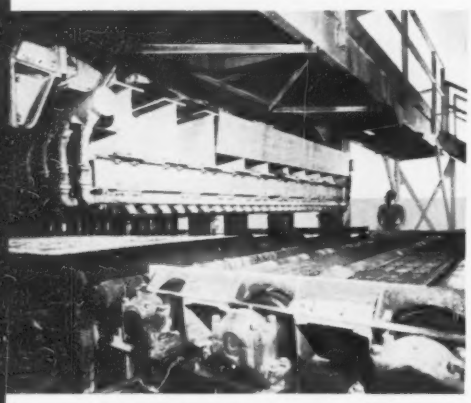


Takes the wrench out of the quench!



AT TOP: 2,500 ton pressure quench using 24,000 gpm of water. For 172" wide x 3" thick maximum plate. Transfer car in foreground.

ABOVE: Plate at hardening temperature in pressure quench prior to closing the platens.

DREVER PRESSURE QUENCH KEEPS PLATE FLAT WHILE UNIFORMLY QUENCHING WITH THOUSANDS OF JET SPRAYS

While as many as 35,000 water sprays quick quench the steel plate, the Drever Quench holds it under pressures up to 2500 tons through the use of ribbed platens. The result? High uniformity of quench and a flat plate, and usually, the elimination of any further levelling operations.

PIONEERING ENGINEERING IN THE QUENCH OPERATION

As an important component of the Drever Plate Heat Treating Lines, Drever Quenches handle plate up to 172" wide x 3" thick and 45' long in fully automatic operation. Designed for versatile operation too, a wide variety of product mix can be quenched as well as plate from both the hardening and tempering furnaces.

DREVER ENGINEERING FOR YOU

Drever engineering has contributed to the advancement of production rates and quality standards in every phase of the heat treating process for both large and small operations. In furnace design, in associated processes, in handling equipment Drever engineering staff has a wealth of experience which can be applied to your requirements. Drever Company, Bethayres, Pa. Phone: WI 7-3400.

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ENGINEERED TO YOUR PARTICULAR REQUIREMENTS

ENGINEERING AND MANUFACTURING FACILITIES AROUND THE WORLD THROUGH ASSOCIATES IN FRANCE, GREAT BRITAIN, GERMANY, ITALY, JAPAN AND INDIA

BRUCE ORR
Climax-Tungsten Div. mgr.

MYLES BRADLEY
Michigan Wire Cloth v. p.

JACK F. HAYES
Bronze Bearings v. p.

RICHARD F. DAUENHAUER
Hills-McCanna sales

Bruce Orr was made manager of the newly formed Tungsten Sales Div. of **Climax Molybdenum Co.**, subsidiary of American Metal Climax Inc. He is in the New York office. He was assistant sales manager, Climax Steel Div., Pittsburgh office.

Myles Bradley was promoted to vice president-operations for **Michigan Wire Cloth Co.**, Detroit. He held the post of purchasing agent and factory manager.

John C. Ewer was made manager of a newly formed Product & Market Planning Dept., Abrasive Div., **Norton Co.**, Worcester, Mass. Others assigned to the department: **R. G. Van Keuren**, as manager of special projects; **W. L. Hardy**, manager-marketing research; and **R. H. Merritt**, product planning engineer. **Irvine F. Williamson** was made manager of Norton's Santa Clara, Calif., plant to succeed **George A. Garrison**, who returns to Worcester as purchasing agent.

Jack F. Hayes was appointed vice president-sales, **Bronze Bearings Inc.**, Chicago. He was formerly with Bound Brook Bearing Corp. of America, and with Amplex Div., Chrysler Corp.

H. W. Cory was made assistant general manager, Norwood, Ohio, Works, **Allis-Chalmers Mfg. Co.** He was general manager of Canadian Allis-Chalmers' St. Thomas, Ont., Works. **Dwight H. Lory** was made assistant works manager, Norwood Works.

Ralph W. Dixon was made purchasing agent at **Datex Corp.**, Monrovia, Calif.

Joseph E. Zwit was appointed vice president-sales, Engineering Div., **Hauck Mfg. Co.**, Brooklyn, N. Y. He was sales manager. He succeeds **William H. Oler**, resigned.

Paul H. Wilson was made general superintendent, Ambridge, Pa., plant, **A. M. Byers Co.**

Richard F. Dauenhauer was promoted from distributor sales manager to general sales manager, **Hills-McCanna Co.**, Carpentersville, Ill.

Francis J. Borowsky was elected president, **George K. Garrett Co. Inc.**, Philadelphia.

Donald G. Harter joined **Kodiak Inc.**, St. Paul, as vice president-research and engineering. He was director of engineering, Decatur Works, York Div., Borg-Warner Corp.

Charles R. Wilt Jr. was made assistant chief engineer, **Selas Corp. of America**, Dresher, Pa.

Alfred W. Lindstrom was made vice president, International Div., **Parker-Hannifin Corp.**, Cleveland.

John J. Varga was promoted to manager of manufacturing engineering, Marquette Div., Cleveland, for **Curtiss-Wright Corp.** He is responsible for tool design, methods and

JOHN C. EWER
heads new Norton dept.

JOSEPH E. ZWIT
Hauck Mfg. v. p.

PAUL H. WILSON
A. M. Byers plant supt.

JOHN J. VARGA
Curtiss-Wright post

CLAUDE W. ELLIOTT

FRED H. PLANK

presidents of McGraw-Edison divisions

JACK GIRARD

JOHN B. VAN DIEN JR.

General Magnaplate promotions

processes, tool control, and estimating.

McGraw-Edison Co. named **Claude W. Elliott** president of its **Lectromelt Furnace Div.**, Pittsburgh, to succeed **Fred H. Plank** who assumes the presidency of its **Pennsylvania Transformer Div.**, Canonsburg, Pa.

Shepherd M. Roberts Jr. was made vice president-general manager, Chicago District, **C. A. Roberts Co.**

Crucible Steel Co. of America, Pittsburgh, appointed **William R. Mogg** assistant director of metallurgy-technical services; and **William H. McCormick** company metallurgical engineer.

Edgar W. Clark, former director of marketing research, **Eaton Mfg. Co.**, Cleveland, was promoted to director of marketing services, a new post.

McLouth Steel Corp., Detroit, promoted **Emory Miller** to assistant plant manager at its Gibraltar, Mich., plant; **Dan Columbus** general superintendent; **Frank Koss** assistant general superintendent.

Larry E. Luthy was made manager-market development, **Cleco Air Tools Div.**, Houston, Reed Roller Bit Co.

John T. Castles was made general manager, Chemical Materials Dept., Pittsfield, Mass., **General Electric Co.** He succeeds **Dr. A. Eugene Schubert**, named manager, Power Transformer Dept.

John T. Brown was elected president, International Div., **J. I. Case Co.**, Racine, Wis.

Arthur T. Lawrance was made manager of the Dunkirk, N. Y., operations of **Alco Products Inc.**

Harold R. Skeels was named manager, Materials Dept., **Bartlett-Snow Div.**, Cleveland, Bartlett-Snow-Pacific Inc.

William F. Hawkins was made sales administrator, Bearing Div., Compton, Calif., **Industrial Tectonics Inc.**

General Magnaplate Corp., Belleville, N. J., named **Jack Girard** general manager of its Electro-Plating & Coating Div., and **John B. Van Dien Jr.** general manager, Non-Destructive Testing Div.

Roscoe Richards was named manager of the Paducah, Ky., plant of **Modine Mfg. Co.** to succeed **A. L. Knox**, who moves to McHenry, Ill., to head Modine production at a plant under construction. Appointments are effective Aug. 1.

H. DeForest Hardinge was made vice president of **Hardinge Co. Inc.**, York, Pa., and **Hardinge Mfg. Co.**

Joseph F. Krepley was made director-extrusion operations, Metals Div., **Olin Mathieson Chemical Corp.**, succeeding **Fred H. Edgar**, recently made vice president-aluminum sales. Mr. Krepley was sales manager-extrusion operations, and is succeeded by **Robert W. Pierce**. They have headquarters in Nesquehoning, Pa., site of one of Olin's aluminum extrusion plants.

EMORY MILLER

DAN COLUMBUS

McLouth Steel plant posts

JOSEPH F. KREPLEY

ROBERT W. PIERCE

appointments in Olin's Metal Div.

Ralph L. Lindner was made vice president-general manager, **Precision Castings Co.**, Cleveland division of Precasco Corp., replacing **A. D. Weigolt**, former vice president, retired. For the last four years, Mr. Lindner has been vice president-manufacturing at Cloyes Gear & Products Inc. He previously spent 22 years with the Light Metals Div. of Thompson Ramo Wooldridge Inc.

David C. Clark was made manager, Merchandise Sales Div., **Jervis B. Webb Co.**, Detroit. He was sales manager of Webb Forging Co.

Bernard H. Regenburg was elected president and general manager, **Belle City Malleable Iron Co.**, and **Racine Steel Castings Co.**, both of Racine, Wis. He succeeds **R. J. Swartout** as president, and **C. S. Anderson** as chief executive officer. Both are retiring from active management, but Mr. Anderson remains chairman. **K. M. Halvorson** was made vice president-manufacturing; **E. K. Simonsen** sales manager.

William J. Eames was named superintendent, Grinding Wheel Div., **Electro Refractories & Abrasives Corp.**, Buffalo.

R. K. Turner was elected a vice president of **Union Carbide Corp.**, New York. **William B. Humes** was appointed president of Union Carbide Plastics Co., a division.

Robert W. Curry was named marketing manager, Vacuum Tube Products Div., Oceanside, Calif., **Hughes Aircraft Co.**

P. R. Mallory & Co. Inc., Indianapolis, named **William H. Starbuck** director of markets; **J. Earl Templeton** director-Western operations.

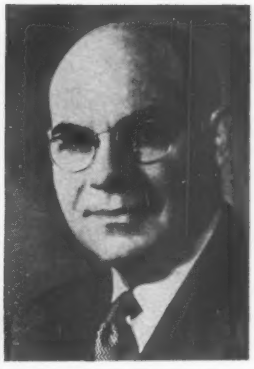
George W. Thompson, general manager of **Altamil Corp.'s** Indianapolis Wire Bound Box Div., Fernwood, Miss., was named a vice president of the corporation.

Richard M. Chewning was elected executive vice president, **Republic Supply Co. of California**, Los Angeles.

R. C. Dunn was made administrative manager at the Baton Rouge, La., Works of **Kaiser Aluminum & Chemical Corp. J. E. Sparkman** was named assistant to the manager of raw materials at company headquarters in Oakland, Calif.

RALPH L. LINDNER
Precision Castings mgr.

DAVID C. CLARK
Jervis B. Webb mgr.



BERNARD H. REGENBURG
heads foundry firms

WILLIAM J. EAMES
Electro Refractories post

MAJ. GEN. JOHN S. GUTHRIE
Motec Industries v. p.

RAYMOND A. DURAND
Edward Valves v. p.

Maj. Gen. John S. Guthrie, former commanding general of the 14th Army Corps at Minneapolis, was named a vice president of **Motec Industries Inc.**, Hopkins, Minn., and made a member of the operating committee. He is vice president for Systems Management, and director of the Moletronics, Motec Engineering, and Mohawk Foundry & Forge Divisions.

Robert Richmond, former assistant sales manager of **Bliss & Laughlin Inc.'s** Harvey, Ill., Div., was named to the new post of manager-special products engineering.

Dale T. Culberson was made materials manager, **Youngstown Steel Tank Co.**, Youngstown, in charge of purchasing, inventories, and traffic. **Lee S. Jackson**, purchasing agent and traffic manager, has retired.

William Mugan was made general manager, **Labeled Metal Products Co.**, Chicago, division of Howe Sound Co.

Raymond A. Durand was named vice president-sales, **Edward Valves Inc.**, East Chicago, Ind., subsidiary of Rockwell Mfg. Co.

Draper E. Tessendorf was made general manager of **Worthington Corp.'s** newly renamed Mechanical Power Transmission Div. at Oil City, Pa.

OBITUARIES...

J. Nevin Pomeroy Sr., 71, chairman, **General Smelting Co.**, Philadelphia, died July 11.

Alvin C. Klinka, 65, president and treasurer, **Acme Iron & Steel Co.**, Milwaukee, died July 8.

Harold R. Saurer, 61, chief metallurgist, **Dayton Malleable Iron Co.**, Dayton, Ohio, died July 9.

John B. Heck Jr., 70, president, **Standard Tool & Die Co.**, Toledo, Ohio, died July 11.

Of all steel-wire manufacturers, *only* CF&I offers you high quality steel wire in all the packages shown above. These packages are designed to help you cut downtime . . . ease storage and handling problems . . . and increase daily production.

1. FIBRE DRUMS – 250-600 lbs. capacity. A sturdy container, with a center core, which holds wire of one continuous length. A metal cover and locking band seal the drum and protect the wire from atmosphere and dirt. Wire is withdrawn directly from the drum into your equipment. Two sizes: full and half drum.

2. SHAPED COILS – 1500-2500 lbs. capacity. This heavy coil contains wire of one continuous length, bundled with four steel straps. Will increase production up to 25%.

3. REEL-LESS CORE – 800-1000 lbs. capacity. Reduces shipping expense by eliminating deposit on reels and cost of returning empty metal reels. One continuous length is wound on a cardboard core. When received at your plant, the wire is placed on your aluminum, detachable-flange reel . . . ready for use.

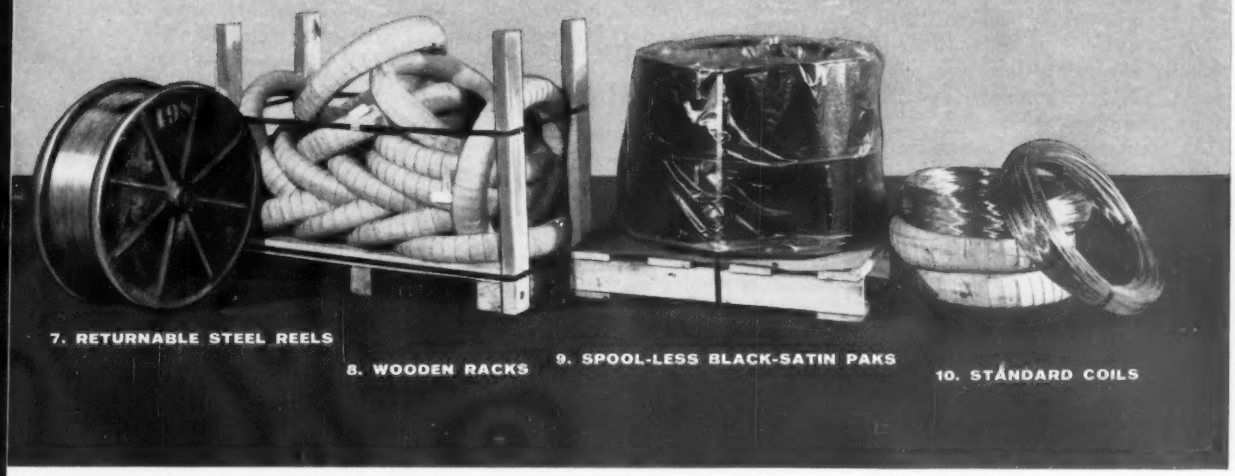
4. RETURNABLE SPIDERS – 2000-3000 lbs. capacity. A sturdy wire carrier consisting of a center core of 2″ steel pipes welded to a heavy base plate. Holds one continuous length of wire, reduces downtime and increases production.

5. DISPOSABLE SPOOLS – 5-70 lbs. capacity. Can be used once and then discarded. Has the advantage of wire on spools with no deposit, no return of empty spools.

6. DISPOSABLE STEM-PAKS® – 500-1000 lbs. capacity. One continuous length of wire on a disposable pallet consisting of a center core attached to a wooden base mounted on 4″ runners. Speeds unloading, handling and increases production.

7. RETURNABLE STEEL REELS – 500-800 lbs. capacity. Holds one continuous length of wire, ready for smooth, even pay-off. Assures you wire free from damage in transit. Because reels require

offers you all ten!



less pay-off space, valuable production area can be saved.

8. WOODEN RACKS – 1500-3000 lbs. capacity. Protects coils during shipping and simplifies in-plant handling. Eliminates need for handling individual coils.

9. SPOOL-LESS BLACK-SATIN PAKS – 2000 lbs. capacity. Provides two 1000 lb. continuous lengths of oil tempered wire wound on cardboard cores, palletized and shrouded with polyethylene. Ideal for long production runs. Cuts downtime up to 90%.

10. STANDARD COILS—100-600 lbs. capacity. Packaged for a wide range of industrial uses. They are securely bundled and can be paper-wrapped for protection in transit and storage.

• • •

For more complete information on each of these ten wire packages, we invite you to consult your CF&I sales office. 8113

THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in All Key Cities

Jones & Laughlin Enlarging Modernization Program

JONES & LAUGHLIN Steel Corp., Pittsburgh, is working out details of a multimillion expansion program. Some unofficial estimates of the corporation-wide undertaking are up to $125 million.

If approved, the program would include modernization of the firm's hot strip mills in Cleveland and Pittsburgh. It would cover a three year period, starting in 1962. It could be broadened if business improves enough to warrant additional spending because the firm has additional capital spending programs under consideration.

J&L launched a $234 million, three year capital expenditure program in 1959. In 1960, capital expenditures for plant and equipment amounted to $80,189,000 compared with $49,686,000 in 1959. Early this year, the company announced plans for spending $50 million in 1961. That would bring expenditures to $179,875,000 for the 1959-61 period.

Projects costing $68 million became operative in 1960. Major items were: A continuous annealing line for tin plate; a new electrolytic tinning line; a large ore sintering plant with a daily capacity of 7200 tons; a battery of 59 coke ovens; a new iron ore mine in Minnesota; and additional sinter screening and cooling facilities at the New York Ore Div.

Projects costing $82 million have become operative or will become operative this year. They include: Two batteries of coke ovens at Pittsburgh; air pollution abatement facilities; and a semi-taconite ore refining plant in Minnesota. A large two furnace, basic oxygen shop at Cleveland is scheduled to be completed in about 90 days. The furnaces will be capable of producing steel at the hourly rate of 200 tons.

Aluminium Ltd. Expands

Aluminium Ltd., Montreal, Que., plans to double its Canadian capacity to roll aluminum sheets. During the next 18 months, it will construct a sheet mill in Kingston, Ont. Cost: $11 million. The expenditure will be made by the company's subsidiary, Aluminum Co. of Canada Ltd.

The mill is scheduled to begin production about the end of 1962. It will be capable of rolling wider sheets and plates and larger coils of sheet material than are available now from Canadian sources. Annual capacity of the mill will be 60,000 tons.

Superior Discontinues Malleable Operations

Superior Steel & Malleable Castings Co., Benton Harbor, Mich., is discontinuing malleable operations. Reasons cited: The "cost-price squeeze" and "the constantly diminishing requirement for the production of jobbing malleable." The firm's Malleable Div. will cease to operate after Sept. 1.

The engineering, technical, and sales staffs of the division will be retained and their efforts will be directed to the Steel Foundry Div. and the Machining & Assembly Div. During the last year, the company has spent about $750,000 on the expansion and improvement of its Steel Foundry Div.

Forms Georgia Subsidiary

National Wire Products Corp., Baltimore, has formed a subsidiary, National Wire of Georgia Inc., to manufacture and sell welded wire mesh for reinforcing concrete. A 34,000 sq ft plant has been leased at Port Wentworth, Ga. W. R. Brown is general manager.

Enters Vacuum Melt Field

Special Metals Inc., New Hartford, N. Y., is planning increases in its production and research facilities. Dr. F. N. Darmara, president of the new company which recently purchased the Metals Div. of Kelsey-Hayes Co., says the firm will supply vacuum melted products in both vacuum induction and double vacuum melted conditions. Present annual capacity of the firm is 7 million lb.

Vice presidents of the firm are H. J. Hamjian, J. S. Huntington, and Dr. Italo S. Servi; secretary-treasurer is T. J. Cahill.

RB&W Forms New Division

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., has organized a Sintered Products Div. for the manufacture of powder metal parts (standard nuts, special nuts and shapes with tapped holes, sleeves, spacers, inserts, discs, gears, rollers, electrical connectors, mechanisms, and bushings). The division is sintering parts from brass, bronze, copper, Monel, nickel silver, iron, and steel (including stainless). J. M. Dill is manager of the division.

Pheoll Buys Scovill Line

Pheoll Mfg. Co. Inc., Chicago, subsidiary of Allied Products Corp., purchased the industrial fastener line of Scovill Mfg. Co., Waterbury, Conn. The operation will become integrated with Pheoll's manufacturing facilities in Torrington, Conn., and Chicago.

Dow Activates Sheet Mill

Two rolling mills of Dow Metal Products Co., a division of Dow Chemical Co., Midland, Mich., are producing aluminum sheets. A four high, 68 in., aluminum sheet mill recently was put in operation at Dow's Madison, Ill., plant. The mill is fed by the Madison plant's 84 in. reversing hot breakdown mill. The facilities complement aluminum sheet production at Dow's Jackson, Mich., plant.

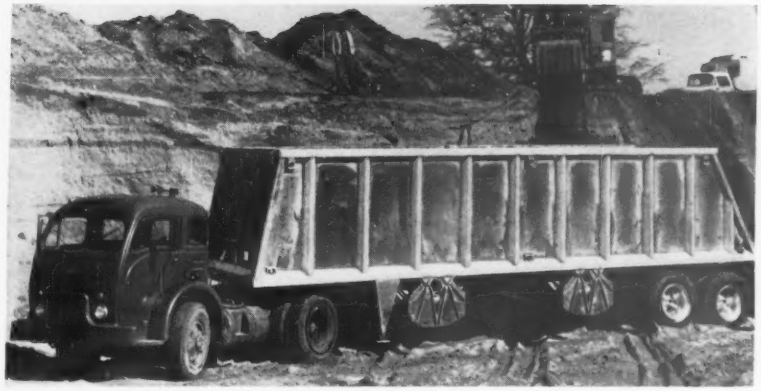
Firms Change Names

National Malleable & Steel Castings Co., Cleveland, changed its name to National Castings Co. The firm operates five divisions and three wholly owned subsidiaries in this country and Canada.

Unigage Corp., Addison, Ill., changed its name to Unigage Instruments Corp. "to indicate the broad line of measurement and quality control instruments being produced by the firm," says R. E. Thacher, president.

Emhart Erecting Building

Emhart Mfg. Co., Hartford, Conn., is erecting a 160,000 sq ft administration and research building in Bloomfield, Conn. The building, to be occupied late next year, will house the company's research, development, and engineering work for the Hartford-Empire, automated, glassmaking machinery manufactured by the Hartford Div.; Standard-Knapp packaging machinery for the Portland (Conn.) Div.; and V&O industrial press equipment of the Hudson (N. Y.) Div.



Aluminum Trailers Boost Coke Payload

LIGHTWEIGHT hopper trailers made of aluminum are hauling 40 cu yd loads of petroleum coke to a calcining plant operated by Kaiser Aluminum & Chemical Corp., at Gary, Ind. The units are said to weigh 25 per cent less than conventional dump bodies designed for 22 cu yd loads. The trailers, which are operated by J. Artim & Sons, Hammond, Ind., were built by Converto Mfg. Co., Cambridge City, Ind., for Trailmobile Inc., Chicago.

ASSOCIATIONS

American Welding Society plans to move its headquarters to the United Engineering Center, facing the United Nations Plaza, New York, early in September. The center will house 19 major engineering societies.

Robert W. Knauft, Chas. Taylor Sons Co., Cincinnati, a subsidiary of National Lead Co., has been elected president of the **Refractories Institute,** Pittsburgh. Avery C. Newton is executive secretary.

Charles R. Bender has been appointed executive secretary of the **National Tool, Die & Precision Machining Association,** Cleveland.

American Electroplaters' Society Inc., Newark, N. J., elected these officers: President, C. G. Borlet, Grand Rapids Brass Co., Grand Rapids, Mich.; first vice president, Manuel Ben, General Motors Corp., Detroit; second vice president, F. O. Beuckman, Eastman Kodak Co., Rochester, N. Y.; and third vice president, E. E. Oberland, Western Electric Co., Baltimore.

NEW OFFICES

Continental Can Co. will consolidate its head office staff and all of its other New York City offices in a new building at 633 Third Ave. in late August and early September.

Aero Hydraulic Div., Vickers Inc., a division of Sperry Rand Corp., New York, opened a regional sales and service office at 333 W. First St., Dayton, Ohio. L. C. Immel is manager of the office.

Computer Dept., Phoenix, Ariz., **General Electric Co.,** established a district sales office at 106 W. 14th St., Kansas City, Mo. Horace N. McNeill is district sales manager.

CONSOLIDATIONS

Hupp Corp., Cleveland, is acquiring **Hercules Motors Corp.,** Canton, Ohio, subject to approval of Hercules stockholders. Hercules produces diesel, gas, gasoline, and liquefied petroleum gas engines.

Carpenter Steel Co., Reading, Pa., will acquire **NTH Products Inc.,** El Cajon, Calif., effective Aug. 1. NTH Products will be operated as a subsidiary. It produces thin wall tubing in such metals as zirconium, titanium, tantalum, columbium, and special alloys of nickel and iron, including the stainless steels.

Atlas Steels Ltd., Welland, Ont., will purchase **Alloy Metal Sales Ltd.,** a wholly owned subsidiary of International Nickel Co. of Canada Ltd. Alloy Metal is a distributor of aluminum, stainless steel and nickel products, and other related metals. It has service center facilities in Toronto, Ont.; Montreal, Que.; and Winnipeg, Man.

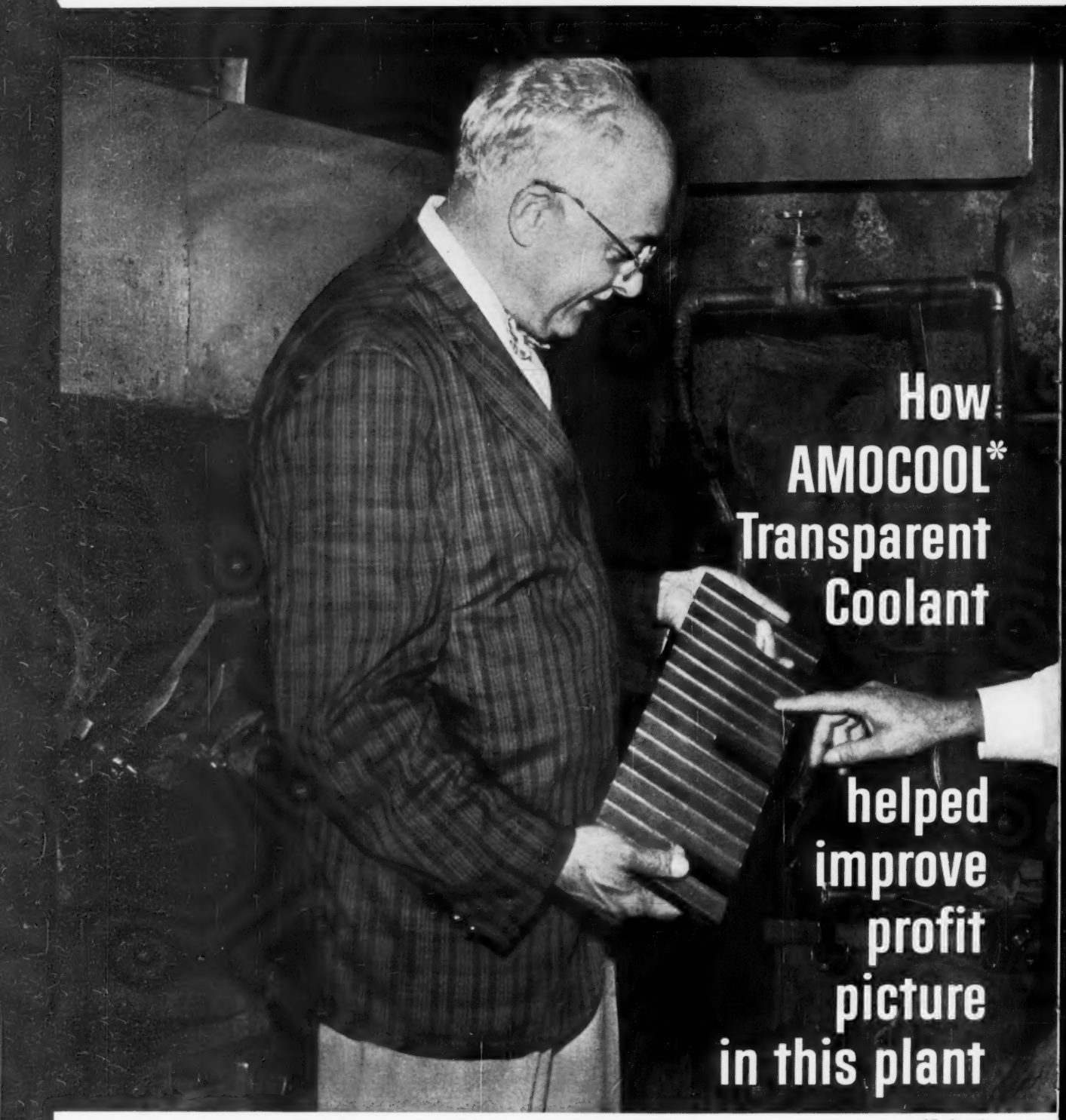
Hydrometals Inc., Chicago, will acquire **Stranahan Foil Co.,** South Hackensack, N. J., producer of thin gage, nonferrous metal foil. R. P. Stranahan will remain as president of the new Hydrometals subsidiary.

NEW PLANTS

Delta-Star Electric Div., H. K. Porter Company Inc., Pittsburgh, opened a plant at Lynchburg, Va., for the production of distribution transformers, lightning arresters, and industrial crane conductor systems. The 250,000 sq ft facility is managed by R. W. Dixon.

H. J. Ruesch Machine Co., Newark, N. J., is erecting a plant on W. Fadam Road, Springfield, N. J., which will increase the company's floor space by more than 25 per cent. The firm makes metalworking machinery.

Smith-Blair Inc., South San Francisco, Calif., opened a 22,000 sq ft plant in Texarkana, Tex. R. A. Ball is manager of Texas operations; D. W. Recht, plant manager. The company makes pipe repair clamps, saddles, flexible couplings and pipeline fabrications.



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

*Trademark

BY PAUL E. "PAPPY" STRATTON

About the Author. "Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

* * *

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Plant manager, John Yonker (right) and Sam Vineh, operator, look on.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

* * *

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

Quick facts about
AMOCOOL
Transparent Coolant

- Clear, transparent fluid
- Controls corrosion on work and machines
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Fire resistant
- Odorless

AMERICAN

AMERICAN OIL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois

Strap fast and use less strapping with this pair of portable power tools

A Signode PN air-power tensioner takes strapping directly from the coil, pulls the strapping to the right pre-set tension every time, and holds the tension while the seal is applied. For this step, the operator is using a Signode Model RCNS air-power sealer. Its pistol grip makes sealing ¾-inch steel strapping an easy one hand job. The RCNS weighs only six pounds. The operator simply sets the tool on the seal and pulls the trigger. Compressed air does the hard work—crimps every seal correctly, positively, quickly. The two tools make a strapping combination that is fast and that eliminates the waste of cut-to-length strapping. Let us arrange a demonstration on your premises at your convenience.

These tools are another example of the variety of equipment available from Signode to meet widely different strapping needs. And from Signode, you get experience, interested help with operator training, tool service, equipment selection, and methods improvement.

Send for Booklet SPD 216 that describes the Signode line of air power tensioners and sealers and shows typical money-saving applications.

First in steel strapping

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STEEL STRAPPING CO.
2645 N. Western Avenue • Chicago 47, Illinois
Offices Coast to Coast, Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

Technical Outlook

LOOKING AT ULTRAFINE POWDER— The Air Force is backing some research for methods of vaporizing metals and other materials at 3000 to 7000° F. Purpose: Manufacture of submicron sized powders. It is expected to contribute greatly to our space effort since properties improve as particle size of materials decreases.

CUT TITANIUM COST—A new process which replaces the chip and sponge briquet with one composed of chips alone is said to cut over-all titanium ingot cost by 5 to 55 per cent, depending on purity. The inventor, Mico Metals Corp., Passaic, N. J., claims it can make 100 to 200 tons of 3 lb briquets a month.

ELECTRONIC 'NOSE'—An electronegative gas detector not only detects but exactly measures gas concentrations as low as 1 part in 10 million, says Westinghouse Electric Corp., Pittsburgh. It's employed mostly for detecting the presence of sulfur hexafluoride.

SPACE METAL RESEARCH— Sodium, potassium, mercury, lithium, and rubidium have been considered for some time as heat transfer metals for space power units. To make them practical, a thorough study of the properties of those metals is being done by the University of Michigan, Ann Arbor, Mich. It's getting $199,000 from the Air Force for the work.

NEW MOLDING TECHNIQUE—A method of making casting molds involves the blending of a binder and a refractory. Treatment makes a bond that is not sensitive to vacuum and doesn't liberate any gas during casting. The new method is inexpensive and adaptable to mass production, says the U. S. Army's Ordnance Corps, Watertown Arsenal, Watertown, Mass.

ALTERNATOR OUTLOOK—A heavy duty alternator is on the way which will provide 12 to 24 volts direct current and alternating current (regular and high frequency). One test unit provides 1 kilowatt of alternating current (60 cycles), 12 volt direct current for battery work, and high frequency power for fluorescent lighting. Variable output and heavy duty features make the units desirable for heavy duty applications. Curtiss-Wright Corp.'s Utica, Mich., division is testing 200 units, says it has orders for many more.

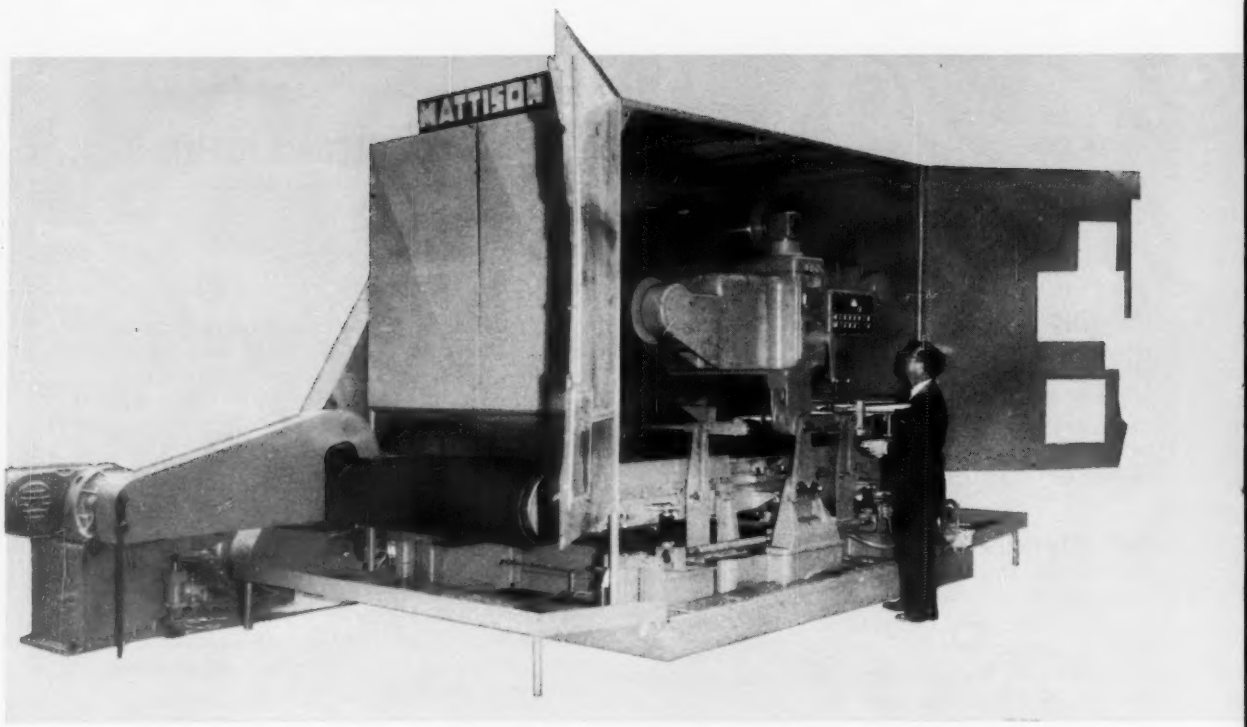
BETTER FURNACE TOOL— A pneumatic system handles dolomite, lime, and ore from centralized, off the floor storage bins, delivering such materials to a mechanical thrower for repairing furnace walls. The technique has been announced by Blaw-Knox Co., Pittsburgh, which heralds it as a major improvement to its standard, rail mounted, hopper type machine.

HERE'S TO LONGER LIFE—Diffusion coatings are expected to cut wear on engine components such as tappets. Research being carried out at Eaton Mfg. Co.'s new Detroit research center employs a low pressure vacuum melting system to provide the coatings.

DUCTILE CAST MOLYBDENUM—Exceptionally high purity casting of molybdenum can be ductile in the as-cast condition, claims Oregon Metallurgical Corp., Albany, Oreg. At 46,000 psi, a cast ingot showed a 3.2 per cent reduction in area at room temperature. After vacuum arc casting, the 100 lb ingot had less than 20 ppm carbon, 20 ppm oxygen, 20 ppm nitrogen, 50 ppm sulfur.

NUTS AND BOLTS UPGRADED— A $350,000 Air Force contract calls for improved fasteners made of molybdenum, columbium, and tungsten for space applications. Operating temperatures range up to 4500° F. Development work is being done by Republic Aviation Corp., Farmingdale, N. Y.

MICROWAVE COOK— Electronic ovens are said to be getting more popular with institutional cafeterias and restaurants. Advantage offered: A customer can select a quick frozen meal, cook it himself in about 1 minute. The setup eliminates the need for an expensive array of steam tables and similar equipment. Current price: Around $800 a unit.



Machines like this conveyor type belt grinder . . .

Belt Machines Hold Honeycomb Tolerances

• LONG before the first B-70 superbomber shrieks into near space, returns on the tremendous investment ($1.3 billion for four planes) will be coming in. In working on the plane, industry is already acquiring new knowledge about building Mach 3 (and faster) vehicles.

For example: Weight restrictions on the massive stainless steel airplane have brought about a solution to the production of honeycomb panels to tight tolerances. It was one of the first problems faced by North American Aviation Inc., Los Angeles, and its subcontractors.

Specifications set up for flat grinding stainless sheets and honeycomb cores called for tolerances of ±0.001 in., says L. G. Brown, engineer, Mattison Machine Works, Rockford, Ill. "They seemed impossible to obtain . . . and they also seemed unreasonable until one finds that the tolerance represents nearly 4000 lb of weight variation on the airplane."

• Conveyorized, wide belt grinders have been modified to solve the cost problems of finishing flat honeycomb on a production basis.

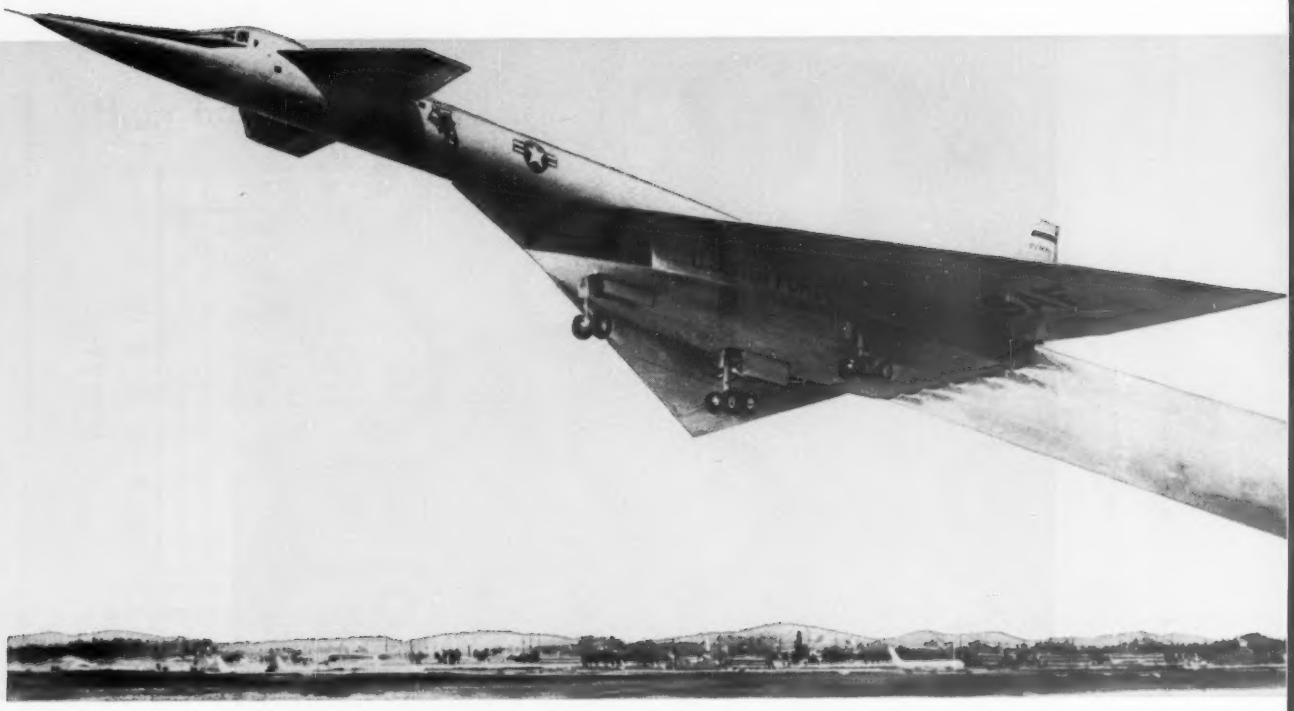
Mattison says aircraft fabricators are using a new type grinder to hold their tolerances within ±0.001 in. Here are some of the features the company cites: The base and main arm of the machine are extra heavy for rigidity and vibration absorption. The contact roll is made of ground steel; it sizes more positively than a soft contact roll could. The machine uses a 20 ft 3 in. long belt; extra length reduces the rate of belt wear.

A conveyor belt (36 to 72 in. wide) feeds the honeycomb panels through the machine. The rubber coated belt is ground flat on both sides on the machine to assure parallelism between the belt and the contact roll. The belt is supported by a ground steel platen under the grinding area. The conveyor table can be raised or lowered by remote control (six precision jacks maintain parallelism), and automatic upfeed increments of 0.0002 to 0.005 in. per impulse compensate for belt wear or part size.

• Batch type processing utilizes the new grinding method to greatest advantage, say B-70 contractors.

Honeycomb cores, supported on the conveyors, feed under the contact roll at rates of 6 to 60 fpm; 32 fpm is the most common feed. The feed is in the same direction as abrasive belt rotation (climb cut). Cores are prepared by pouring a heated mixture of beeswax and rosin into three or four rows of cells at the ends of the panels.

Entire widths (to 72 in.) are covered in one pass. Mr. Brown advises: The more the full width of the conveyor is utilized, the more



turn out precision stainless honeycomb for this superbomber

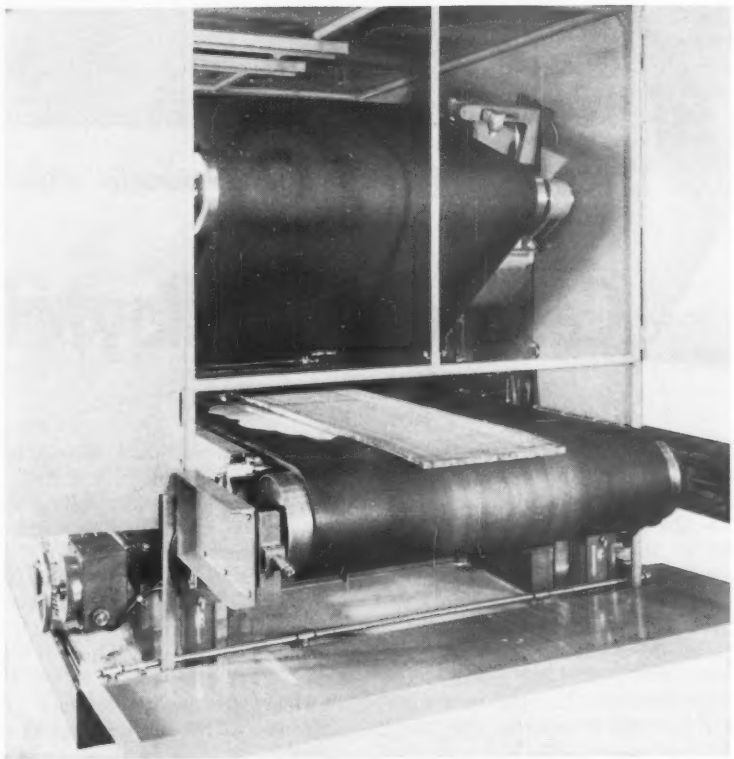
economical production will be.

• **Thickest cores are fed first.**

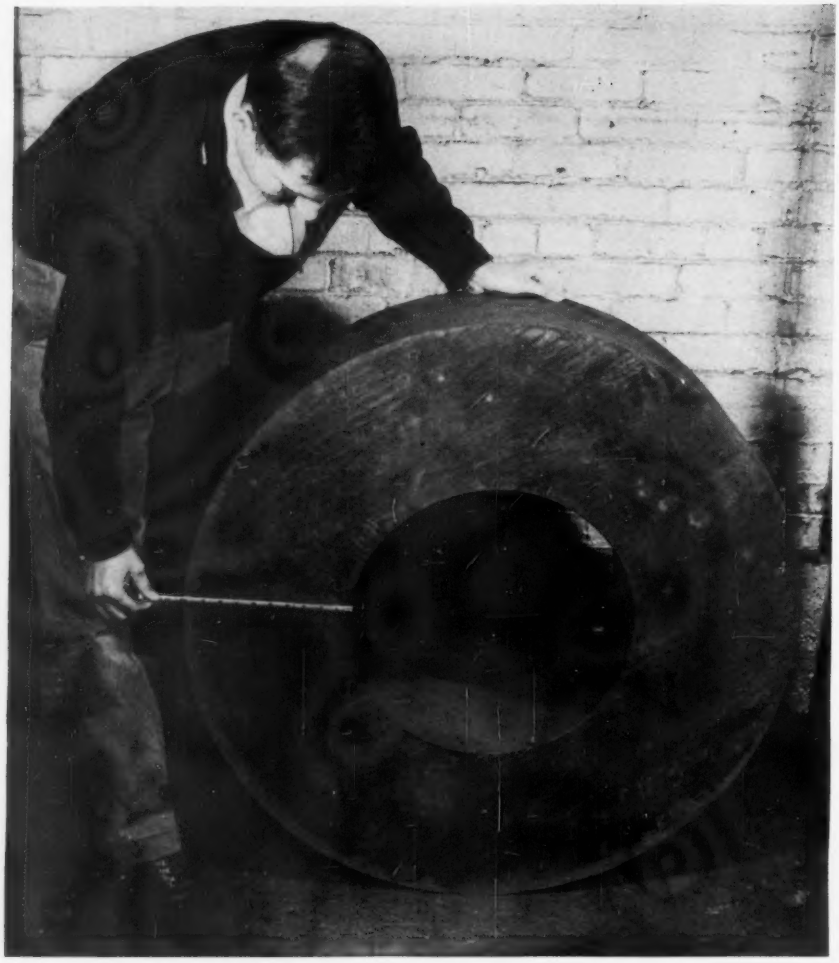
Excessive stock removal setting may result in bending over the cell walls. So the belt's first grind is on the thick sections with light cuts at high feed rates. Successive passes, with automatic upfeed on the table, take off all the high spots, then grind the flattened surface.

After each pass through the machine, the cores are reversed to continually flex cell edges and aid burr breakoff. Cores are inverted every second pass until one side is completely clean and flat. Then stock is removed from the other side until the core is within 0.002 in. of required thickness. After that, the upfeed is cut out; two or three passes spark out work to a final thickness within ±0.001 in. on 60 in. widths and ±0.0015 in. on 72 in. widths.

Thin walls (up to 0.0015 in.) require 320G or 240G aluminum oxide or silicon carbide abrasive belts and light cuts of only 0.001 to 0.002 in. per pass. Heavier cell walls require 180G aluminum oxide abrasive belts. Cuts of 0.003 to 0.005 in. per pass are possible.



Opened doors show diamond shaped grinding head. Drives up to 150 hp have been used on these 72 in. wide machines. Here, a ground section of stainless steel core emerges on the conveyor belt



End platen held bore diameter in heat treating; plug guides lasted 16 times

Cast Ferrous Alloy, Hardened in Air,

• WEAR RESISTANCE is combined with machinability in a new ferrous casting material. Parts are machined as-cast, then hardened in air so that there is little risk of cracking or dimensional change.

The alloy is called AQ Meehanite by the developer, Meehanite Metal Corp., New Rochelle, N. Y. The combination of higher hardness and little distortion has led to a number of applications for the alloy. Among them:

- Rolls for rubber cutting.
- Screws used for mixing aluminum oxide grain.
- Conveyor track wheels in a sintering plant.
- Plug guides in a rolling mill.
- Briqueting dies.
- Crusher rolls.

Other uses include dies and cams in which the combination of hardness and wear resistance with ease of machining is valuable.

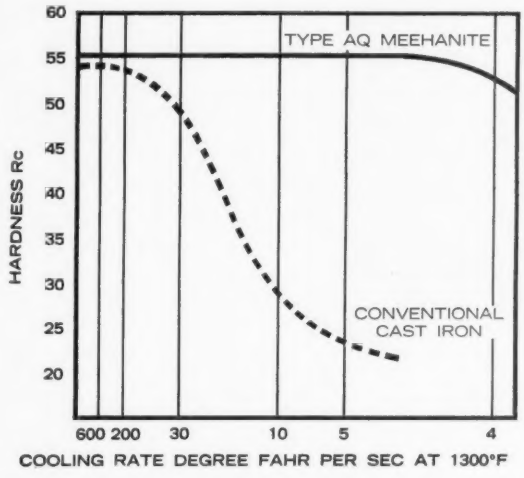
• Heat treatment develops the hardness and wear resistance of the alloy.

Hardening is attained by cooling in still or forced air from an austenitizing temperature of 1650° F. The ability to use air cooling is responsible for the low distortion; it also reduces the possibility of cracking on hardening because there is little difference in temperature between the inside and the outside of the part during cooling.

Where castings are large, there is an additional advantage. Handling through a quench is eliminated.

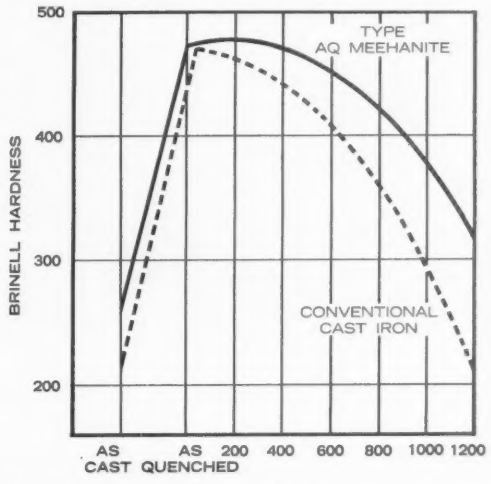
It is also possible to flame harden the alloy; the section is heated to 1500-1700° F and allowed to cool. Flame hardening is employed for hardening the working edges

High hardenability

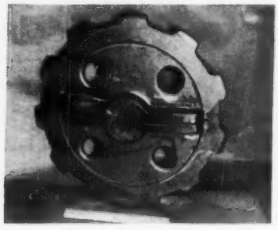


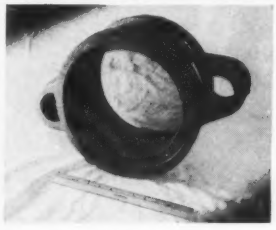
Permits air cooling in heavy sections

Tempering resistance



Shows improved stability to heat





as long; sprocket and housing are 477 Brinell . . .

Shows Little Distortion

and surfaces of dies, punches, rollers, and cams.

Variations in basic composition are permissible; they determine the hardness of the processed casting.

• The alloy is resistant to tempering.

AQ Meehanite is more resistant to tempering than usual cast irons. The company states that it maintains its hardness level well on exposure to high temperature. And in parts that must withstand repeated exposure to temperatures several hundred degrees above room temperature, the alloy may be helpful. It is also suggested for hot forming dies and similar parts.

Although the material's hardness is close to that of conventional hardened cast iron, it falls off more slowly when it is heated. And the usual cast irons require liquid quenching to develop the higher hardnesses.

• The heat treated alloy will work harden, developing still higher hardness.

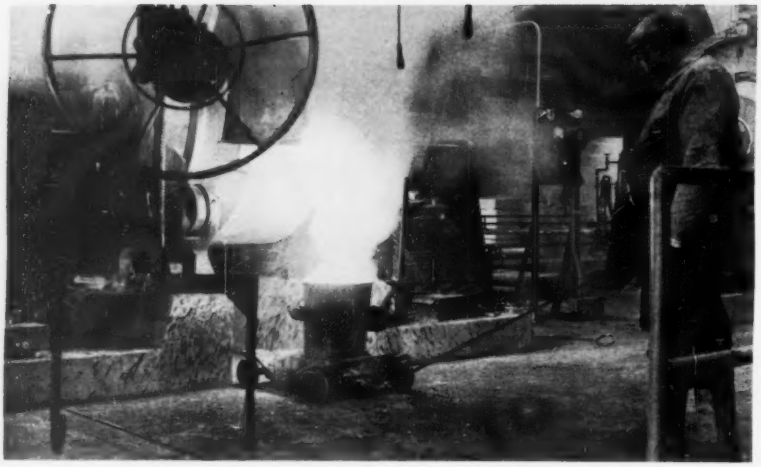
Additional wear resistance is afforded by work hardening characteristics. The hardened structure contains austenite, which breaks down into martensite in service, further contributing to hardness and wear resistance.

The additional hardness, from 30 to 50 Brinell hardness numbers, can be developed by deep freezing which conditions the austenite for transformation. The grain size of the original material determines the amount of this secondary hardening on a sample.

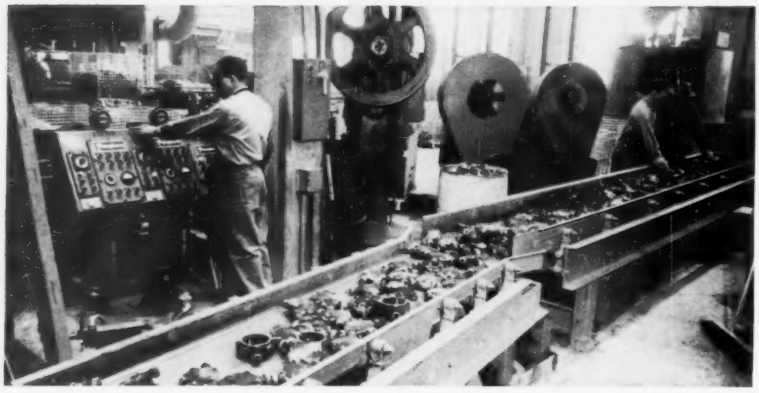
• Alloy variations are suggested, depending on section size.

The company reports that the base chemistry is similar for all variations of the alloy, but the key elements are varied according to the section of the castings. Control of composition is important.

In the as-cast condition, the structure of the alloy is pearlitic. In the air quenched condition, the structure is low temperature bainite or acicular ferrite. As-cast hardness is 280 Brinell, and air quenched hardness is above 480 Brinell, the company reports. Tensile strengths correspond; as-cast, the tensile value is about 50,000 psi, while the heat treated tensile strength is at least 65,000 psi, and values of 70,000 or even 75,000 psi are not uncommon.



Monorail hooks readied as furnace is tapped . . .



Conveyors carry castings to shotblast machine . . .

High Output Expected at Automated Bronze Foundry

• AN AUTOMATED bronze foundry operated by about 90 employees of Neptune Meter Co., New York, is expected to turn out 27,600 parts per 8 hour shift. The parts, which weigh 1 ounce to 440 lb each, are used in the company's line of liquid measuring devices.

The new facility replaces a foundry that couldn't be enlarged and obsolete production equipment.

• Conveyors carry mold and core sand from storage silos and hoppers to the molding stations.

A network of conveyor belts and monorails provides maximum handling speed, efficiency, safety, and freedom from unnecessary physical work, says a company spokesman. A conveyor belt carries cleaned sand to the molding stations; 300 tons of sand are recirculated through the production cycle, 1½ times each 8 hour shift, when the foundry is operating at capacity.

Core sand is carried to a muller inside the main building by a pneumatic conveyor system.

An automatic molding machine, of the blow fill, hydraulic squeeze type, is used on one of the molding lines. The operating sequence is dialed to a preset time cycle. The machine, which has a capacity of 220 molds per hour, rams cope and drag molds simultaneously. Green sand molds are completed in 12 seconds.

Five other mold lines are operated in the plant. Equipment includes five jolt squeezers, two pairs of jolt squeeze strip machines, two jolt rollers on split pattern flask, a Hydroslinger, and a hard ramming section for specialty molding work.

• Automatic machinery separates sand and cores from castings and takes castings to the cleaningroom.

Molten bronze is furnished by two Ajax induction furnaces, each rated at 2000 lb per hour; one Detroit carbon arc furnace, rated at 1500 lb per hour; and two Detroit arc units, each rated at 1200 lb per hour.

After molten metal is poured into the molds, they are dropped to a vibrating conveyor, below the floor level, then to a shakeout. Sand and cores are separated from the castings, which are then taken to the cleaningroom on an inclined apron conveyor.

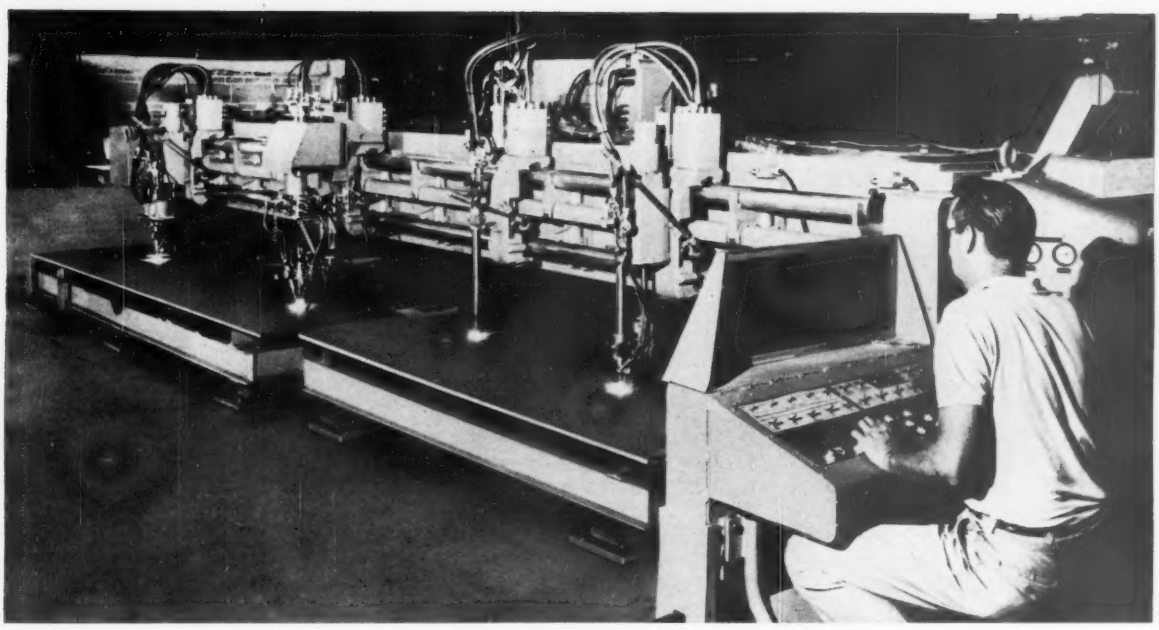
The castings go through several cleaning operations, including shotblasting. Then they are conveyed to inspection tables, where imperfect pieces are culled and returned to the melting furnaces.

• All metal and sand are analyzed in the quality control laboratories.

Molding sand is analyzed for moisture, permeability, green compression, clay content, grain size, and loss on ignition. Core sand is subjected to a similar battery of tests.

Metal is analyzed when it is received and when it is cast for the presence and percentages of copper, lead, tin, nickel, iron, and phosphorus.

Percentages of antimony, aluminum, sulfur, silicon, and manganese are also determined.



Rigid bridge can take four torches, holds accuracy to 1/64 in. . . .

Tape Operates Flame Cutter

• **COMPUTERS were introduced to the welding industry with the showing of a numerically controlled flame cutting machine by Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York.**

Operating from a standard, eight channel punched tape (General Electric's Mark Century), the machine's four torches can cut plates up to 20 ft wide and 6 in. thick in any length to practically any two dimensional shape. Accuracies of plus or minus 1/64 in. are maintained.

Other features include:

• Three cutting torch types. (You can elect to have a torch with kerf compensation or an automatic three torch head which allows you to cut one or two bevels and a land all at once. Tracking adjustments are made automatically while the torch moves.)

• Automatic height adjustment and contour compensation. (A probe senses significant changes in plate surface.)

• A control panel (manual override) that permits an operator to make minor cutting adjustments while the torches are operating.

Computer operation also permits engineers to quickly and accurately determine the most efficient, waste reducing layout for cutting many shapes from one sheet.

• **Significance: The machine is expected to be the forerunner of a versatile device for joining practically any two mating (contoured) edges. Operators can join or cut parts without making a formal engineering drawing or a template.**

Aside from the ability to cut complex shapes, the introduction of numerical control to a welding machine has these implications:

1. Other welding devices can be mounted. For example, plasma arc torches, or any of the several semiautomatic arcwelding systems can provide programed cutting, surfacing, plating, or joining of complex shapes.

2. If suitable "fingers" or sensing devices are employed, the machine could fill a long standing need for a universal, automatic welder that joins the edges of curved pieces.

The Airco cutting machine can mount up to four cutting torches on its "bridge" which rolls on two hardened steel rails. Servomotors control the motion of the torches and bridge in two dimensions. The computer stands nearby in its own air conditioned cabinet.

Once engineering dimensions have been punched into the tape, the computer takes over operation. Torches are lighted automatically; preheat begins; and oxygen is raised from 20 psi to cutting pressure at the right time. After the shape is cut, the machine either stops or moves automatically to the next starting position.

The cost? $100,000. Principal beneficiaries at first are expected to be shipyards, steel mills, and suppliers of large precut shapes.

As with numerically controlled machine tools, early applications may necessarily be controlled by the complexity and size of shapes to be cut. Experience may show that production of ordinary parts could be profitable.

Builder Sees Machine Tool Upturn

• MACHINE TOOL orders are headed for an upturn, says a leading builder. Sparse through the first six months this year, they are picking up slowly but steadily.

T. Lawrence Strimple, president, National Acme Co., Cleveland, expects his company to ship as much in 1961 as it did last year, about $30 million—"a good peacetime rate." And, he adds: "Orders are coming in at a pace that will maintain or improve on that level."

• The predicted upturn is based on a boost in spare parts business.

The theory: Industry doesn't buy much new capital equipment when it has idle capacity. Mr. Strimple says: "Before we can expect to sell large quantities of new machine tools, the ones in industry must be busy, and when they get busy we can tell it by the increased orders for spare and replacement parts. And our parts business is on the increase."

• Foreign companies are continuing to order U. S. machines.

Mr. Strimple spent four weeks in Europe surveying the situation. "England, West Germany, Italy, Sweden, India, and Japan are still in a buying mood. To a lesser extent, France is too," he says.

Mr. Strimple admits that part of the reason for his company's success in foreign markets is that European builders have up to two year order backlogs on some popular size machines. He feels that will work to the advantage of U. S. builders at least until mid-1962. "Our exports (high production machinery) are flourishing. They are now running in excess of 40 per cent of our total shipments. The key market abroad for us is the automotive companies, and unless they start canceling their plans, they'll be good customers for some months to come." The dwindling U. S. market for foreign cars is cited as a basis for hedging.

• Sales behind the Iron Curtain are a possibility.

As yet, National Acme hasn't sold any machines to Iron Curtain countries. But Mr. Strimple would sell there if a good order came along. He explains: "Trade isn't a matter of sentiment, it's a matter of economics. We leave our political and defense business to the men in Washington. If we want to export to Iron Curtain countries, and Washington says it's all right, we'll do it."

"We've had a pretty good first half, partly because of good export business. Now we see signs that domestic buying soon will be picking up too. An increase in our replacement parts business means the machines already installed are getting busy, and that's when customers begin to buy," says National Acme's T. Lawrence Strimple

Titanium Carbide Goes to Market

MANAGEMENT at Vascoloy-Ramet Corp., Waukegan, Ill., has signed an agreement to make and market Ford Motor Co.'s titanium carbide tool bits.

Announced several years ago by Ford (STEEL, Mar. 16, 1959, p. 62), the material has proved especially good for semifinishing and finishing on most steels and cast iron.

Vascoloy-Ramet calls the material VR-65. During field work with the material, a Midwest manufacturing company found it could mill 300 and 400 series stainless steels at 1900 sfpm, removing 30 cu in. of metal a minute. It has been adopted for production.

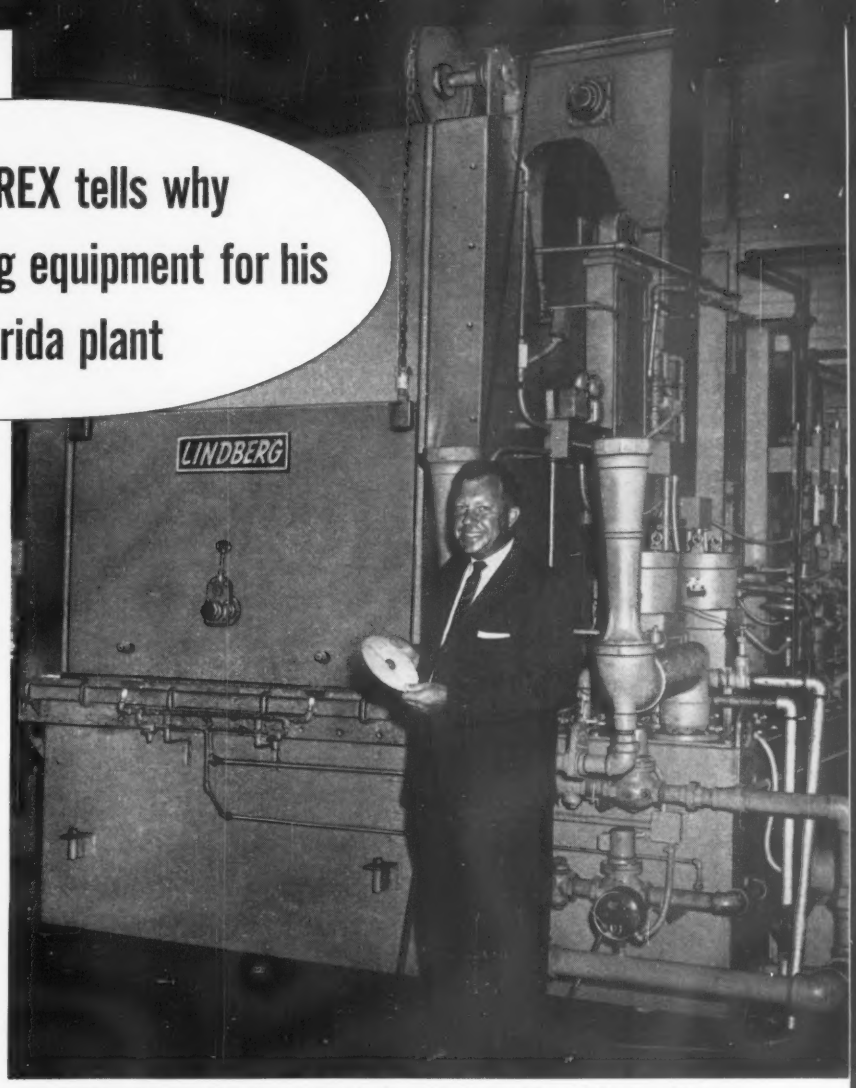
Another company averaged 550 pieces from 1118 steel at 1100 sfpm with 0.0025 in. feed. Conventional carbides produced 340 pieces.

V-R recommends negative rakes for some severe roughing or interrupted cuts.

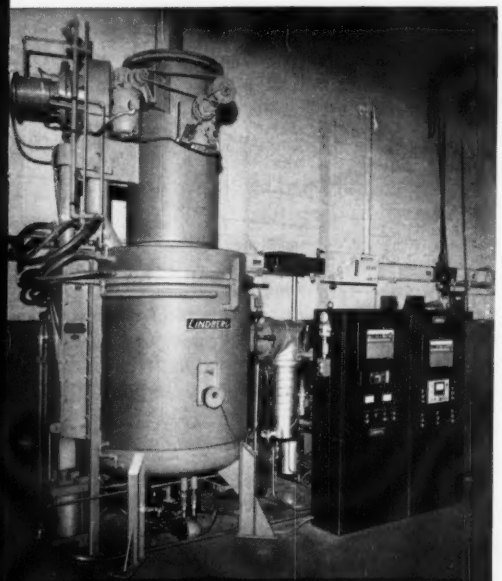
J. WALTER REX tells why he chose Lindberg equipment for his new Florida plant

QUOTE from Mr. Rex

"When we designed our new plant, Rex of Florida, Inc., we made sure we could provide the Florida metal working industry with complete heat treating services. After carefully surveying the industrial activities we would serve we knew we would be called upon to offer scientifically controlled, high quality heat treating for a variety of metals, both ferrous and non-ferrous, and an unusual diversity of sizes, shapes and weights. Our long experience with Lindberg furnaces and atmosphere controls assured us that we could depend on Lindberg equipment to help us meet most efficiently the widely varying demands of our Florida customers."



J. Walter Rex, President, Rex of Florida, Inc., Fort Lauderdale, with Lindberg high temperature, all-purpose furnace, one of six Lindberg units specified for this new plant. Mr. Rex, also President, J. W. Rex Company, Lansdale, Penna., is recognized as one of the foremost metal working authorities and his commercial heat treating operations are among the largest and most important in the country, particularly in treating components for rockets and missiles.



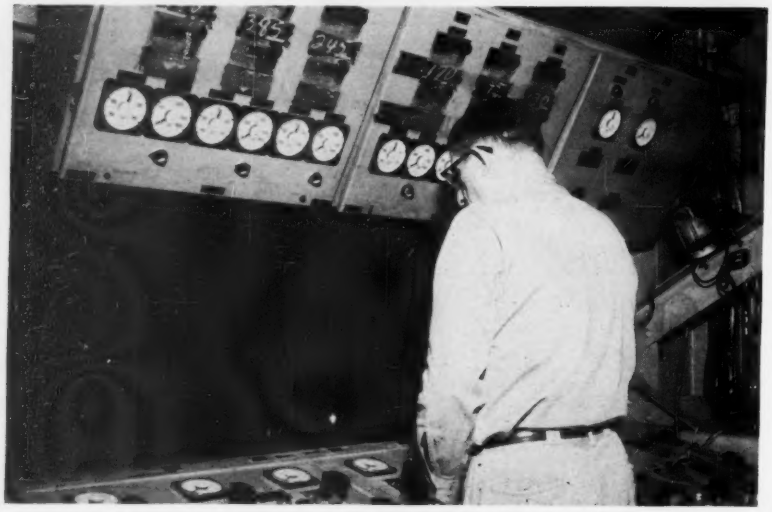
Latest Rex purchase from Lindberg—new vacuum furnace for Lansdale, Penna., plant

Mr. Rex's confidence in the ability of Lindberg equipment to meet the most exacting commercial heat treating requirements is based on the years of efficient and dependable service rendered by Lindberg units in his commercial heat treating operations. He has been a Lindberg customer for nearly 20 years. We're glad that he has found our equipment so satisfactory. We're very well satisfied with Mr. Rex as a customer, too. Altogether, including the units for Rex of Florida, Inc., he has purchased 34 Lindberg units over the years.

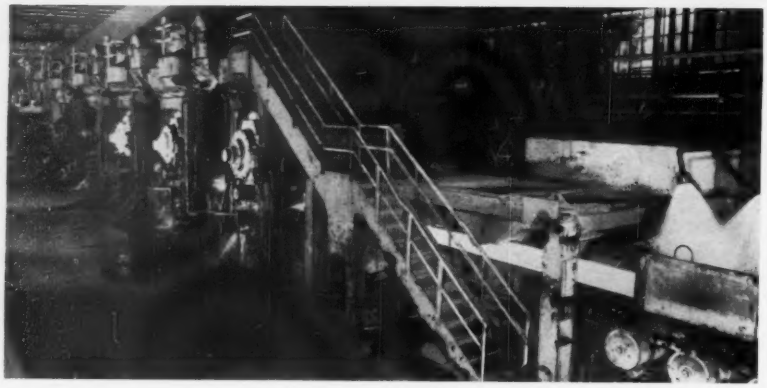
Lindberg offers the most complete line of fuel-fired and electric furnaces and equipment for heat treating ferrous and non-ferrous metals available to industry. If you have any problem in heat treating, get your local Lindberg representative's help now. You can depend on his experience and Lindberg's engineering and design know-how to provide exactly the right equipment for your need. And it's easy, too! Just call your Lindberg Field Engineer (he's listed in your classified phone book) or write us direct. Heat Treating Furnace Division, Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, Spain, Switzerland and West Germany.

LINDBERG
heat for industry



Modernization improves gage control . . .



and cooling for mill rolls, runout table

Quality Standards Are Met By Rebuilt Hot Strip Mill

• A CONTINUOUS, hot strip mill installed in 1936 at Ford Motor Co.'s Steel Div., Dearborn, Mich., has been rebuilt to make it competitive with the most modern rolling equipment.

Some of the improvements: More exact speed control, automatic gage control, improved heating and descaling facilities, and better water systems to cool rolls and strip.

• Explaining the move, John H. Russell, of the Steel Div., says: "Sheet or strip steel that was acceptable ten years ago cannot meet quality standards in today's market."

One of the big differences he cites: "Today's product is held to much closer gage tolerances."

• Uniform gage is vital to the user of hot rolled strip and to the cold mill that is processing hot rolled coils.

"Gage uniformity is important in many fabricating areas," says Mr. Russell.

"In the manufacture of automobile frames, for example, thickness must not fall below the figure assumed by the designer, or chassis strength is jeopardized. Of course, the designer can assume a certain gage variation and use steel that's heavy enough to insure strength. But that makes for an overweight frame.

"Use of uniform gage strip would reduce cost while eliminating useless weight."

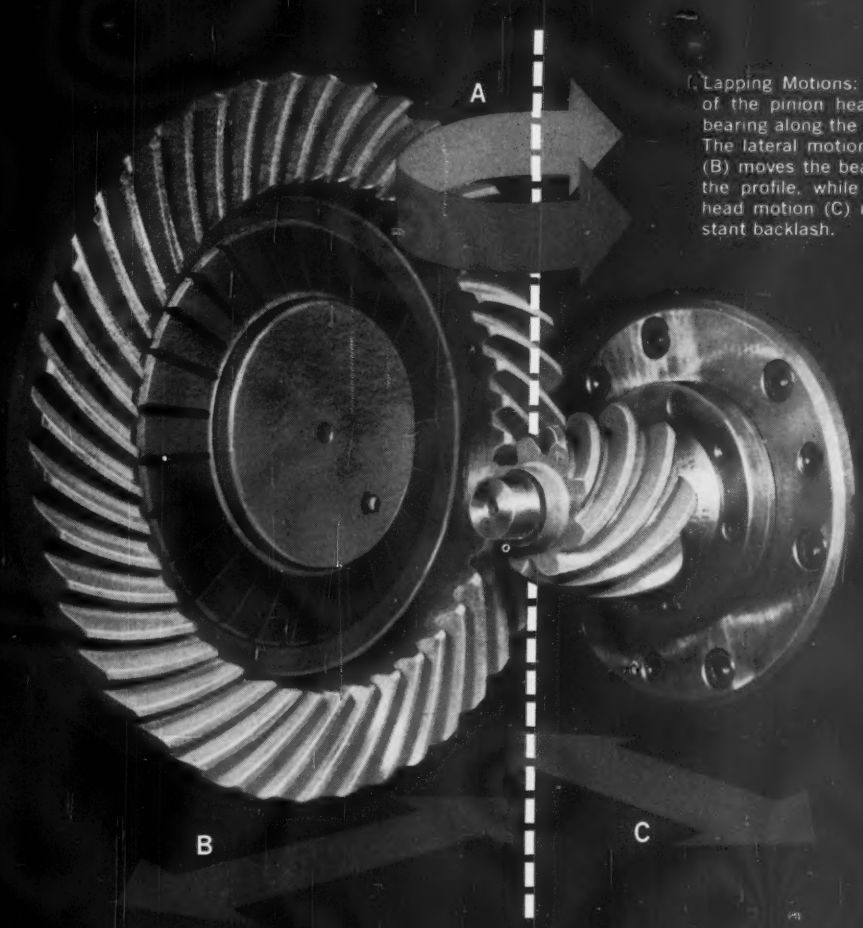
Uniform gage also makes for better performance in stamping dies, says Mr. Russell. And it is desirable in the cold rolling mill, where the back of one coil is welded onto the front of the next, and any gage increment across the weld might cause fabricating difficulties or performance deficiencies.

• Gage variation is minimized by exact speed control and automatic gage control.

The automatic gage control system, supplied by General Electric Co., Schenectady, N. Y., will eliminate fluctuations in thickness through the strip (at cold spots in the slab), plus gage increase from the front to the back of the coil (caused by gradual cooling of the slab during rolling). That gage difference will be held to ± 0.002 in. with the gage control system vs. 0.010 in. (total) on manual control, rolling strip 0.095 in. thick.

Load sensing devices, mounted under the bottom backup chuck on each of the six mill stands, measure the rolling force and mill spring. The mill spring, added to the unloaded roll opening, is equal to the loaded roll opening. Roll force is determined for each strip thickness, and the mill is set to roll at that force.

The gage control system on stands 2 and 3 regulates screwdowns to hold roll opening constant, regardless of incoming gage or hardness. Result: Uniform thickness is delivered from those stands. The speed system at stands 5 and 6 regulates tension between stands 4, 5, and 6, by controlling speed on stands 5 and 6. That makes for



Lapping Motions: The swing motion of the pinion head (A) sweeps the bearing along the length of the tooth. The lateral motion of the gear head (B) moves the bearing up and down the profile, while the lateral pinion head motion (C) maintains the constant backlash.

New "Swing Pinion Cone" motions lap gears to 26" diameter automatically

Several design innovations in the new Gleason No. 504 Lapper combine to offer you a *more flexible* machine, *more accurate* results; a machine that will give you *more consistent* gear sets.

The new *SPC** motions allow a more rigid design—and the gear tooth surface responds more quickly and more consistently than to the previous types of lapping motions. Production rates are substantially increased.

The swinging motion of the pinion head sweeps the tooth bearing area along the length of the tooth, while horizontal motions of both heads move the bearing up and down the tooth profile, while maintaining uniform backlash.

Servo Controls provide for simpler setup and operation, and further contribute to increased speed and accuracy. All lapping motions are established by simple dial settings. This electrical control is positive and fast acting.

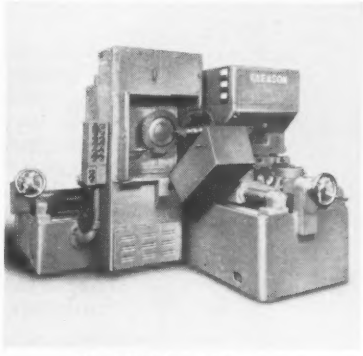
You can lap hardened spiral bevel and hypoid gears with 90° shaft angles, and conventional gears with shaft angles from 50° to 110°. Add an angle plate for the pinion head and you extend the work range from 10° to 160°.

An optional variable speed drive motor permits spindle lapping speeds from 200 to 2000 RPM.

No cams or special parts are required from job to job other than arbor equipment.

For more information and specs, write us. We'll be glad to send full details promptly.

*SPC means "Swing Pinion Cone."



No. 504 Hypoid Lapper

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

FAST!

Your hack sawing machines will produce faster cutting-off on all types of work when they are equipped with unbreakable Marvel High-Speed-Edge Hack Saw Blades.

Why? Because these are the blades specifically designed to take the high speeds and heavier feed pressures demanded by today's production schedules.

What's more, your operators know—or will soon learn—they can increase speed and pressure without endangering themselves or the machine, because these are unbreakable Marvel High-Speed-Edge Blades . . . the blades that have set the standard for all other blades to match—if they can.

Ask for Marvel High-Speed-Edge Hack Saw Blades by name and you can be sure you're getting the unbreakable blades designed to give you maximum accuracy and speed in your cutting-off operations. Leading Industrial Distributors have Marvel Blades in stock.

Write for the latest Cutting Tool Bulletin
and the name of your nearest Marvel Distributor.

MARVEL *Metal Cutting* **SAWS**

BETTER MACHINES
BETTER BLADES

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

B-1127

extremely slight gage refinement.

The screwdown system uses adjustable voltage control for fast response.

At top voltage, screwdowns on stand 2 run at 0.065 in. per second; screwdowns on stand 3 run at speeds up to 0.055 in. per second.

• Sheet shape is improved by added mill stiffness in the finishing train and better roll cooling.

Much larger backup and work rolls were provided for in the first two finishing stands to minimize mill deformation under load and to help control gage and crown. Roll sizes and roll neck diameters were also increased as much as possible in the older stands.

Roll cooling water is delivered to the mill rolls at 125 psi vs. 20 to 40 psi before the revamp. The sluiceway under the mill was enlarged for greater runoff capacity to keep the bottom backup roll from being partly submerged during rolling.

• Surface quality is upgraded with a modified descaling system and runout table improvements.

A high pressure descaling system delivers 1500 gallons of water a minute at 1600 psi vs. 600 gallons a minute at 1000 psi before the mill was modernized.

The automatic spray system provides double, top and bottom sprays on the delivery side of the first scale breaker and a single top and bottom spray on the last three roughing stands. Double top and bottom sprays are used on the delivery side of the second scale breaker.

• Physical properties are improved by increased heating capacity, higher mill speeds, and more effective water spray on the runout table.

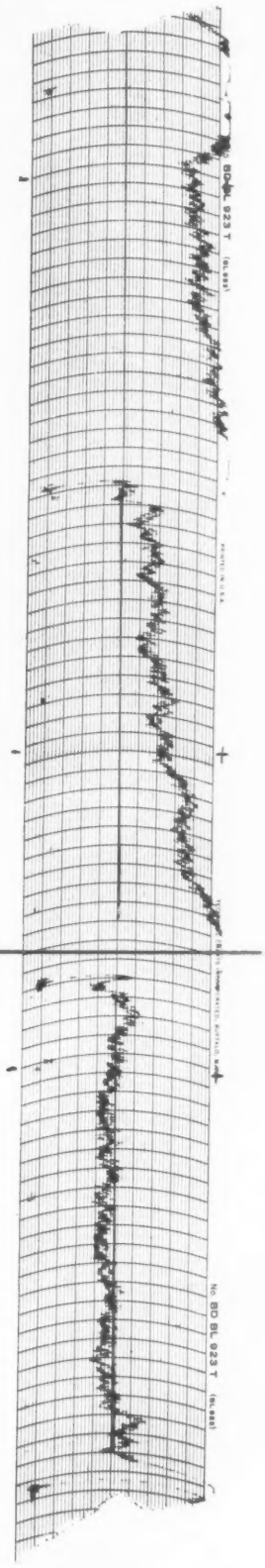
Slab heating capacity was increased by installing a fourth furnace, capable of heating 95 tons of slabs an hour, and increasing capacity of two older furnaces to the same figure. (One of the three original furnaces was already at that rating.)

Heavier motorroom equipment made it possible to increase mill speeds. And new piping and sprays increase the strip cooling capacity on the runout table.

Sample charts, made during trial run, show . . .

Gage Variation, Rolling with Manual Control:

Recorded readout from x-ray gage at delivery end of last finishing stand shows thickness of strip as it is rolled. Chart center line represents nominal gage, and pen deflection shows variation in thousandths of an inch. (Full scale deflection shows 0.005 in. over or under the nominal value.) These two traces show the effect of cooling as the slab passes through the mill—strip is only 0.002 in. oversize at the lead end but exceeds 0.005 in. oversize at the tail end. "Cold" spots from slab furnace rails show up as localized, oversize areas



With Automatic Gage Control:

Strip gage isn't more than 0.002 in. over or under the nominal value. Screws are run down automatically to compensate for mill spring and hold the mill openings constant, regardless of incoming gage or hardness

B-1127

the Cost of Making Steel

with NATIONAL CARBON'S "Four-Point Program"

Steel men know: The heart of the electric furnace is the electrode. Upon it depends so much of the success of furnace operations. But an electrode's performance is based on more than its component materials alone. Electrodes must be *engineered* to meet particular and demanding production conditions . . . and backed up by the supplier's reputation, service and facilities. Let NATIONAL CARBON help you reduce production costs through its "Four-Point Program."

Point 1

75 years of research and production experience in carbon products have built maximum life into "National" electrodes . . . providing more tons of steel per pound of electrode . . . saving the industry millions of dollars in materials and down-time.

Point 2

An industry-wide training program covering electrodes and electric furnace practices . . . designed to provide highest product performance through better utilization of power . . . to reduce refractory maintenance.

Point 3

Advanced electrode packaging and special-device gondolas speed shipments when and where needed . . . to save inventory and storage space . . . to keep investment at the most economical level. National Carbon's pool-car program provides these advantages for customers remote from its plants.

Point 4

Unsurpassed raw material supplies and technical skills at strategically located plants minimize electrode costs.

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

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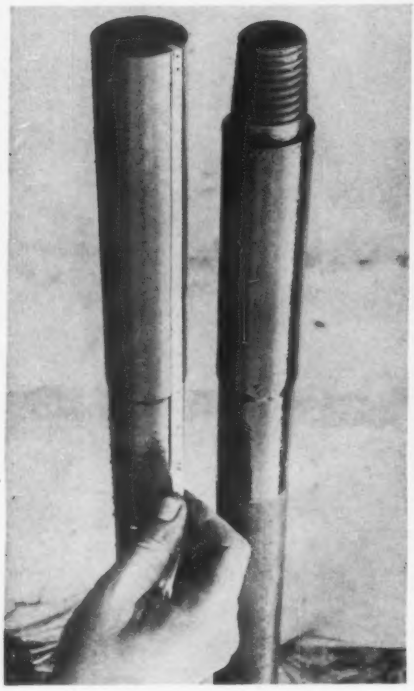
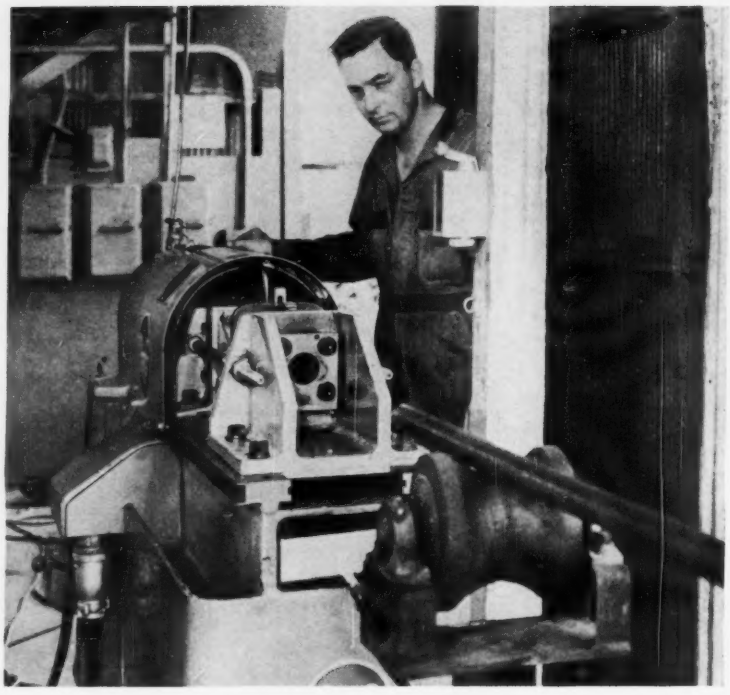
UNION CARBIDE





Tool joints are welded to small diameter tubing . . .

Prototype Friction Welder Proves Process Feasible

• THE COMMERCIAL feasibility of friction welding has been confirmed at the Oklahoma City (Okla.) plant of American Iron & Machine Works Co. Inc., a subsidiary of American Machine & Foundry Co.

A contract for about 1000 friction welds on 15,000 linear ft of tubing was filled for Oil Field Rentals Inc., Ft. Worth, Tex. The welds were made on a prototype machine that was developed by AMF's Research & Development Div.

• High speeds, light pressures, and favorable cost data make the process competitive.

Light pressures and high speeds are used to produce welds applicable to a wide range of materials and geometry, says AMF. Cost data compiled during the production run indicate that friction welded joints are competitive with threaded and coupled joints, and with pressure welded joints.

Speed is said to contribute substantially to the low cost of the process. In spite of normal handicaps of prototype operation, the machine averaged 20 welds an hour—and the rate was frequently stepped up to 27 an hour. That is comparable to the speed of flashwelding, and it's far faster than most other methods, says the company.

Improved machines, now in the design stage, will better that performance substantially, say AMF engineers.

• Weld quality was proved before production runs were started.

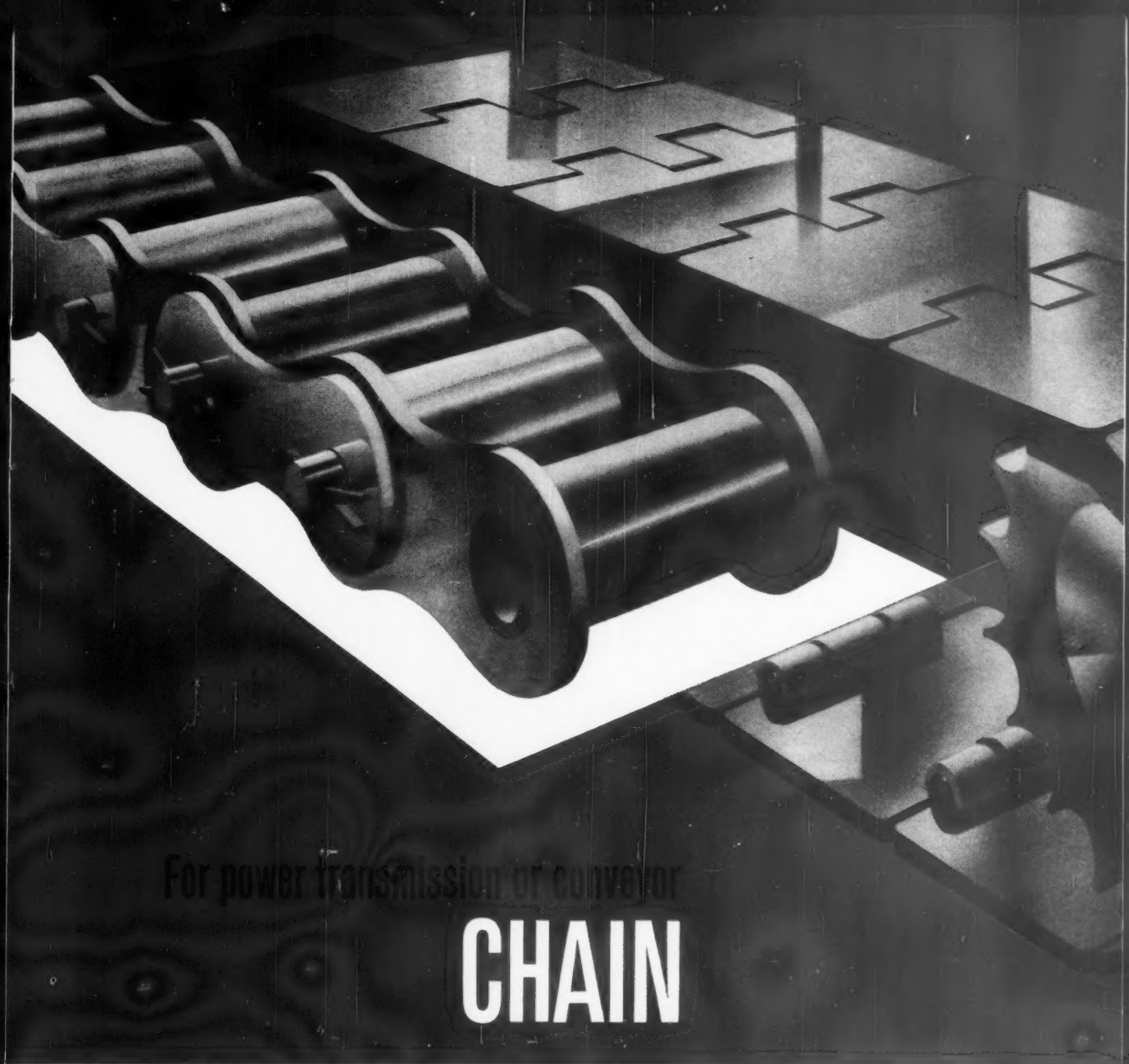
American Iron engineers experimented with the process for more than six weeks. They welded and tested more than 500 joints. About 100 of the joints were subjected to destruction tests; more than 400 were examined microscopically.

The prototype machine is based on a two year study by the Research & Development Div.

• Tool joints welded to small diameter tubing make for more flexibility in well drilling and servicing.

The $1\frac{1}{4}$ in. tubing is used for "completion" and "workover" (assisting in oil production and recovery) by drilling inside $2\frac{7}{8}$ in. tubing that's encased in cement.

The new joint, designed by American Iron engineers, is a small scale design, based on the company's experience with standard diameter drill pipe. The joint is said to be stronger than threaded and coupled joints previously used, and the smaller pipe is said to offer drillers more flexibility.



Superior STAINLESS

foils corrosion—lengthens life

The Superior Stainless combination of higher strength for heavier loads, abrasion resistance for longer wear, and corrosion resistance for maximum service life and cleaning ease is well illustrated in these applications by Atlas Chain & Manufacturing Co. Plus values to the maker are Superior's uniform fabricating ease and dependability—prompt deliveries—close cooperation at all times. Why not enjoy these benefits for *your* stainless strip applications? Call us!

SUPERIOR STEEL DIVISION

OF

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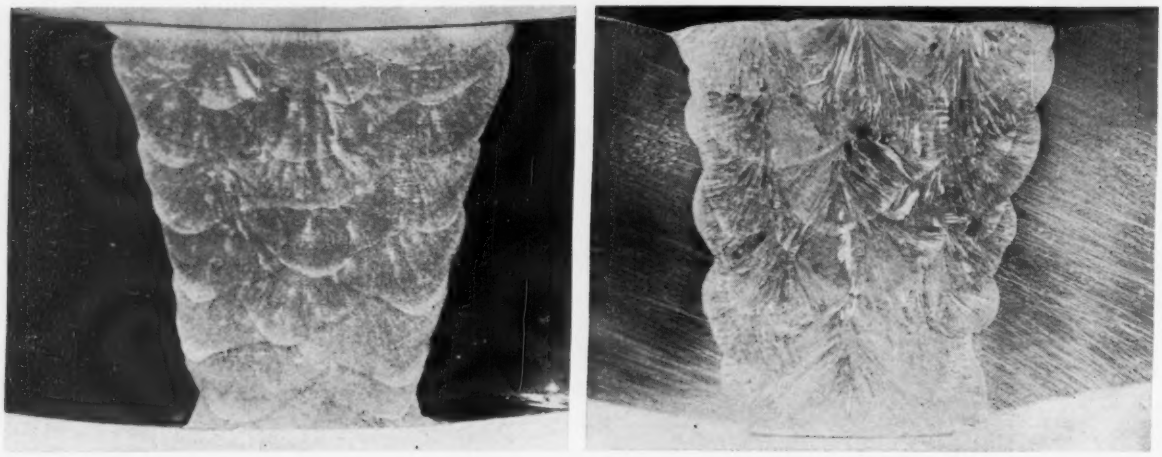
Stainless Steel



Alternating current weld (left) has better homogeneity and macrostructure than direct current (reverse polarity) weld (right), claims Airco

AC + Emissive Wire = Sound Welding

• STRONGER, more uniform welds are being made possible through an alternating current technique developed and refined by research people at Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York.

It employs a continuous electrode covered with emissive rubidium and cesium compounds and a gas shield.

Advantages claimed:

• Deposits are more homogeneous than those made with a direct current arc. Mechanical properties are comparable.

• Arcs are completely stabilized with reduced "magnetic blow,"

• Alloy losses from the electrode are low.

• Stainless welds have higher Charpy impact values than those made with more conventional gas shielded techniques.

• The alternating current power supply is comparatively simple and inexpensive.

In addition, says Airco, alternating current welding makes the (Mig) process a lot easier to apply to thinner gages of metals. Tests by Airco with Types E308, E308L, and E321 stainless welding wires prove that alternating current deposits have good strength and ductility. Researchers note that Charpy impact strength (minus 100° F) is considerably higher. Probable reason: Differences in structure of weld deposits.

• Three sometimes undesirable characteristics of direct current arcs can be offset or eliminated by alternating currents.

First, an argon shielded direct current arc (usually reverse polarity) makes the workpiece the hotter of the two terminals. The weld pool is fairly fluid, making it difficult to hold in vertical or overhead positions. A stabilized alternating current arc cuts the heating effect to less than half, improving out-of-position welding, states Airco.

A second characteristic, the tendency to wander, produces undercutting along weld edges. Oxygen additives to the gas shield eliminate or reduce that effect, but the gain is partially offset by the oxidization of some alloying elements during welding of stainless. A stable alternating current arc doesn't undercut.

Stainless Weld Metal Properties

	Alternating Current	Vs.	Direct Current
Shielding gas	Argon		99% Argon 1% Oxygen
Tensile	88,800 psi		85,750 psi
Yield	67,600 psi		65,100 psi
Elongation in 2 in.	46%		40%
Reduction in Area	66%		64%
Fracture	Shear		Shear
Impact Strength (ft/lb at minus 100° F)	**100, 97, 96**		**77, 76, 58**
Number of Weld Passes	21		18

Note: Wire is 0.045 in., Type E308L.

Finally, residual magnetic fields in the plates being welded deflect direct current arcs. Such forces, called arc blow, can deflect droplets to produce a lot of weld spatter and poor bead shapes. Alternating current arcs aren't affected, says Airco.

• To obtain a stable alternating current arc, it is essential that proper electrical emission characteristics be provided. Loss of arc when welding current passes through zero (twice for each cycle) is prevented.

Wire electrodes uniformly coated with compounds of rubidium and cesium meet that need without relying on electrical "crutches." Such a coating can be applied to low carbon and stainless wire by standard strand dip, batch dip, or spray processes. Whichever is selected, the coating must be uniform throughout a coil. A number of commercial methods are available, says Airco. Shelf life is said to be quite good.

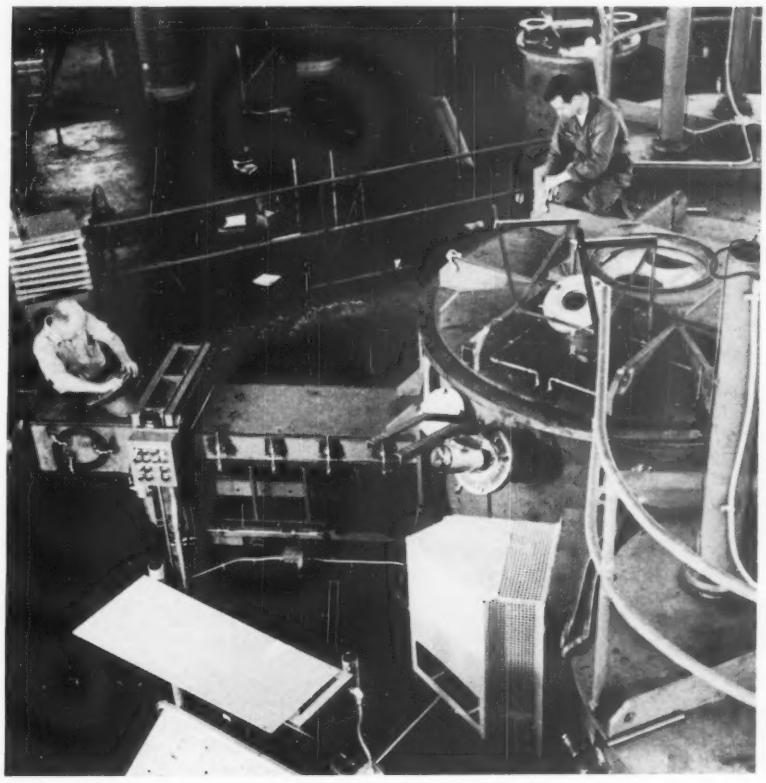
• Lab tests indicate that the absence of oxygen in shielding gas contributes a more uniform weld structure in stainless (less columnar macrostructures) and less loss of alloys.

Test results for alternating current deposits show good strength and excellent ductility for E308, E308L, and E321 stainless deposits. Macrographs of alternating current welds do not have a columnar structure such as that deposited by direct current (see photos). The etching behavior, says Airco, suggests that an alternating current deposit is more uniform. The combination of more uniform grain size and less segregation enhances the low temperature impact strength of such weld metal.

Pure argon shielding is adequate to keep stainless deposits clean and well shaped, says Airco.

• Argon gas modified with up to 25 per cent carbon dioxide works well with heavy carbon steels. Pure argon is satisfactory for sheets up to 0.125 in. thick.

The addition of carbon dioxide aids operators in producing flat, well shaped deposits, says Airco. It also increases the weld area below the plate surface. Sufficient manganese and silicon are retained to suppress porosity.



The weigh hopper on the main scales is controlled by a master panel on the main production floor (inset). Operation is automatic—each batch is monitored and recorded at a readout station

Big Electron Beam Furnace May Spark Pricing Changes

• AN ELECTRON beam furnace that can turn out 1 million lb of specialty steels and refractory metals per year has been installed at Temescal Metallurgical Corp., Berkeley, Calif. Ingots measuring 20 in. in diameter by 6 ft long will be made routinely.

The company expects the unit to have a broad influence throughout the metals industry—and particularly on the pricing structures of refractory metals and specialty steels and the quality of finished products.

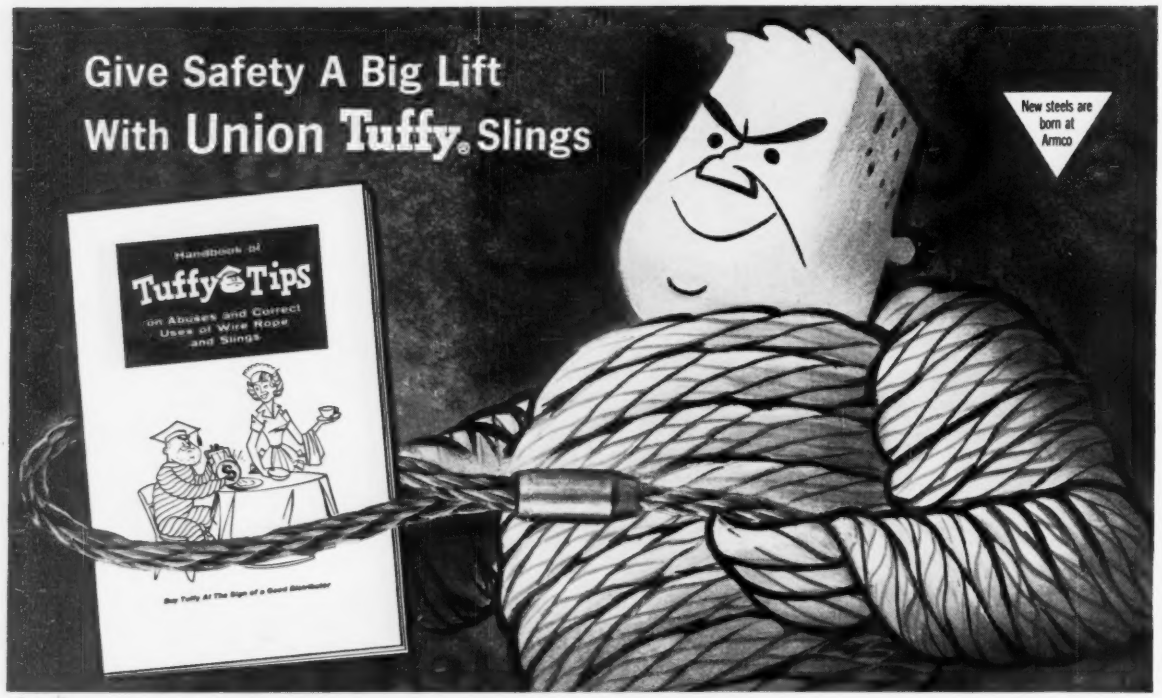
• Startup of the furnace marks the company's entry into the metal ingot business.

Much of the capacity will be used to make metals for atomic energy, missile, and spacecraft applications. Nonmilitary markets include the specialty steel industry and the production of standard forged products.

• Crude grades of starting material can be used to produce the large, highly purified ingots.

The furnace heats up by bombarding raw materials with a beam of electrons. The resulting kinetic energy provides high levels of heat. Heatup is instantaneous. In addition, the melting takes place in a vacuum which quickly draws off many impurities, such as hydrogen. The furnace weighs 25 tons and stands three stories high.

Temescal first started work with the electron beam method (melting titanium powder) in 1953. The company says it has installed ten units that are in production work.


Give Safety A Big Lift
With Union Tuffy® Slings
New steels are born at Armco
Handbook of
Tuffy Tips
on Abuses and Correct Uses of Wire Rope and Slings

Union's Tuffy has written a book. The purpose is to make a mental contribution to Safety—one that will supplement the physical safety factors Tuffy Slings have contributed through a unique combination of strength and flexibility.

The many Tuffy Tips in the book, on the proper use of slings and hoist lines, will prove almost as helpful in providing longer service as has the patented 9-part machine-braided wire fabric construction of Tuffy slings. Send for this book—no charge to sling users. See how Tuffy-Tips, Tuffy Slings and Tuffy Hoist lines work in hand-and-glove harmony to cut hoisting costs and down time in every kind of materials handling.

Four Special Union Wire Slings

In addition to famed Union Tuffy Slings, Union Wire Rope offers, in a full range of sizes:

1. **Hand Braided** six and eight-part slings.
2. **Uni-ply**—a flexible multi-part rope laid sling with pressed-on metal ferrule.
3. **Press-Grip** wire rope sling with pressed-on metal ferrule.
4. **Uni-Grip** wire rope sling with return loop splice and pressed-on metal ferrule.

Union Wire Rope **Tuffy Tips** on safe use of Slings and Hoists

Safety Council Cites Factors In Lifting Injuries:

The National Safety Council points out that nearly a fourth of all compensation cases are the result of unsafe handling, cautions against:

"(a) Handling loads that are too heavy; (b) lifting or lowering with back instead of leg muscles; (c) handling load with an insecure grip and failing to watch where hands are placed; (d) handling without sufficient help or failing to use mechanical equipment; (e) handling before getting a firm footing; (f) lifting or lowering with a jerking, twisting movement, or when the body is in an awkward position."

Free! Two Valuable Tuffy Handbooks

1. "Tuffy Tips." Many more safety hints. Tells how to get longer service from slings and wire rope. Chock-full of do's and don't's to save money.
2. "Tuffy Sling Handbook." Helpful data on the selection and use of slings —types, dimensions, weights, fittings, rated loads, safety-approved signals.

Write Union Wire Rope, Armco Steel Corporation, 2160 Manchester Ave., Kansas City 26, Missouri

4-61

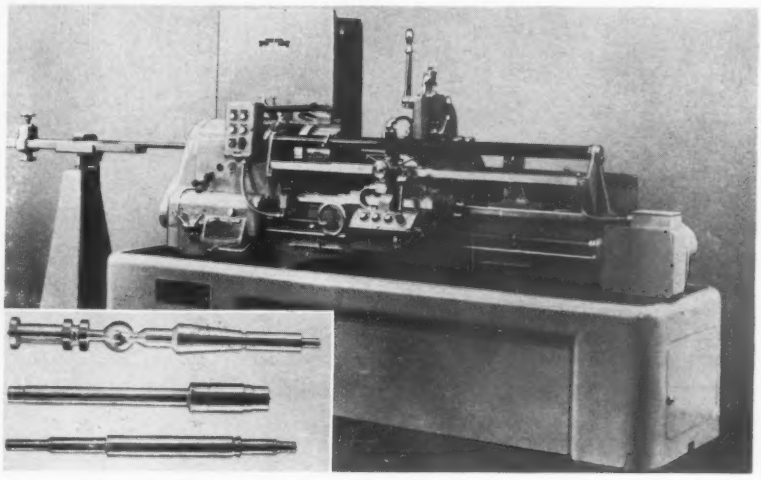
ARMCO Union Wire Rope

Centerless Turning Unit Machines 40 in. Lengths

EASY, fast, contour turning of round, square, and hexagon bar stock can be done on the Trace-O-Matic, centerless, shaft turning machine, says the manufacturer.

The unit features a rotating bar stock support that is adjacent and travels with the turning tool. The maker claims the proximity of the bar stock collet support to the turning tool throughout the entire turning operation eliminates the need for the tailstock center. Bar stock lengths up to 40 in. or two or more short parts can be handled in one pass.

For further information, *write* Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. Y.



Low Production Costs Stressed in Broaching Unit

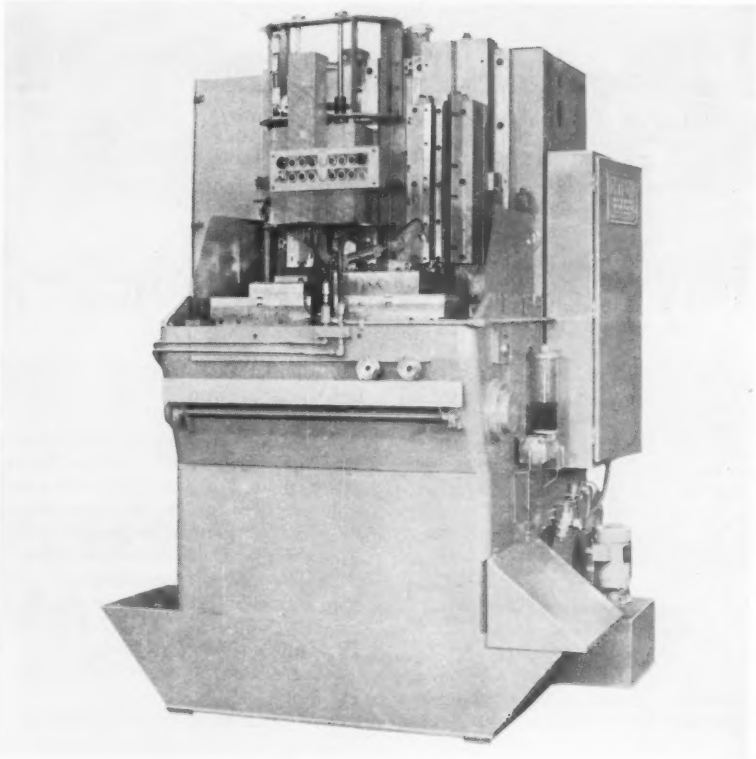
BY PERFORMING the same amount of work that normally would tie up two machines, the manufacturer claims this vertical, dual ram, combination surface and internal broaching machine can reduce direct labor costs 50 per cent in processing a wide range of parts.

The company also reports the 5 ton, 42 in. unit can cut overhead costs from 30 to 50 per cent and save up to 30 per cent in floor space.

The machine operates at 45 ft per minute. Two different operations can be done on different workpieces or on the same piece. Alternating action of the rams enables an operator to easily handle loading and unloading. In a part requiring an internal and external operation, a finished part can be produced in one cycle. In some applications, automatic loading and unloading can be arranged.

Multiple fixture setups can be mounted to each shuttle table. Clearance for the internal pulldown op-

(*Please turn to Page* 110)



Standard Forge & Axle Co. forges 5-inch by ½-inch Pittsburgh Seamless Mechanical Tube ends down to 2⅝" solid steel wheel spindle ends (cross section above). The Montgomery, Ala., plant then machines and grinds bearing surfaces to .0005-inch tolerance to produce single-piece, 20,000 pound capacity trailer axles. Trailer operators benefit from higher payloads because . . .

They Throw Away The Holes—And Save Weight

The trick in making a seamless steel tube is piercing a hole in a round of solid steel.

But Pittsburgh Steel Company's Seamless Steel Mechanical Tubing makes the full circle in production of trailer axles at Standard Forge & Axle Co., Montgomery, Ala.

Standard, in effect, throws away the holes by forging the tube ends down to solid steel again, leaving only a hollow steel center and spindle section.

The result: a lightweight, one-piece trailer axle made entirely from a single length of seamless tube—including load bearing wheel spindles, precision ground for bearing and seal seats.

The advantage: assured strength and safety of seamless steel, plus, for example, reduced axle weight for trailer operators in a 20,000 pound capacity axle.

Starting with a seamless steel tube 5" x ½" x 87⅞" for this particular axle, Standard upsets both ends, then swages them down to the shape of a spindle with a 2⅝" solid end.

That's deformation of the roughest kind.

But Pittsburgh Seamless Mechanical Tubing takes it in stride, then bounces back under heat treatment with the physical properties required for precision finishing of the critical spindle surfaces, and the toughness necessary for a long life in hard service.

And that kind of performance takes seamless steel tubes with exceptional internal soundness, consistent grain structure, and chemical and dimensional uniformity.

Pittsburgh C-1040 grade Seamless Mechanical Tubing supplies these properties consistently—for this type

After upset, Pittsburgh Seamless Mechanical Tubes, with 5-inch OD and ½-inch wall, are swaged to solid steel spindle shape on drop forge, at right. Standard's heat treating process refines grain, restores toughness of steel.

Standard also produces high-strength inserted spindle trailer axle by inserting forged alloy steel spindle with 4.065-inch OD into 4.040-inch burnished ID of 5-inch seamless steel tube under 50,000-pounds pressure.

Standard Forge & Axle Sales Manager James A. Rumbley says Pittsburgh Steel Company, as longtime major supplier of seamless mechanical tubes, "leaves nothing to be desired in product or service."

axle and for Standard's high-strength inserted spindle type.

James A. Rumbley, Standard's sales manager, says:

"Trailer axles are high-weight carrying members subject to tremendous load shocks. So we use the finest materials available to assure our customers trouble-free service. Seamless steel mechanical tubes help us to do that, with complete safety and at less weight.

"For many years, Pittsburgh Steel Company has been one of our major tubing suppliers. It has left nothing to be desired either in product or service."

That's standard practice with Pittsburgh Steel—whether supplying seamless mechanical tubing to Standard's specific requirements, or to yours. Be certain with Pittsburgh Seamless. Contact one of the district offices listed below.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

Steel

(*Continued from Page* 107)

eration is achieved by overhanging one of the shutter tables. The maker says the shuttle table will not deflect under peak loads. It's always locked in broaching position. Tables and machine slides are interlocked (hydraulically and electrically) to protect machine and tooling from damage. The handling system for the internal tooling is independently powered but is tied into the main power system through electrical interlocks.

For further information, *write* Detroit Broach & Machine Co., Rochester, Mich.

Manual or Tape Control Possible on Milling Unit

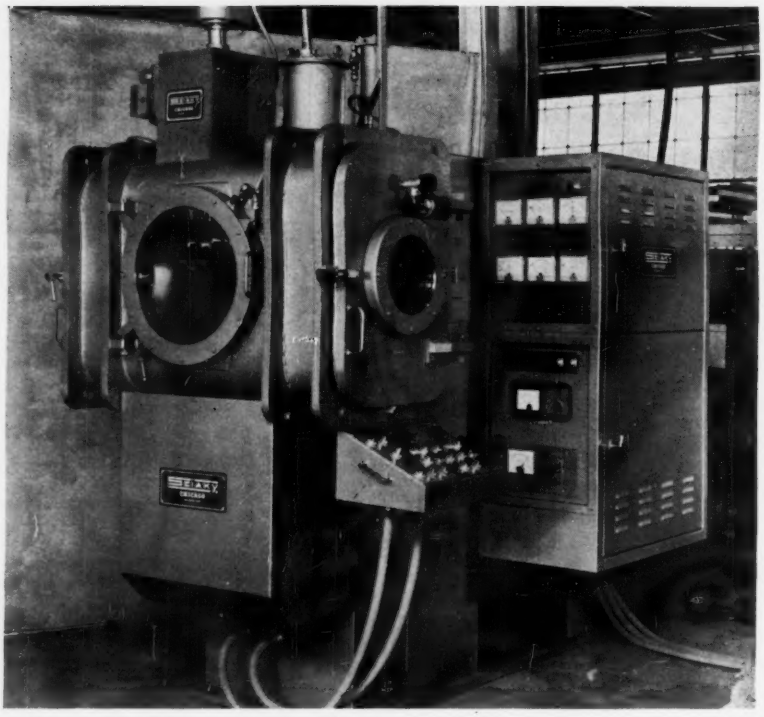
SMALL SHOPS can automate precision milling with the Ultra-Sonic numerical tape control package.

The Position Master contains a transistorized tape punch, a Bridgeport vertical miller (fitted with a digital transducer assembly, position indicating controls, and motor drives), and a transistorized control console (containing a digital converter, tape reader, and motor controls).

The company says that the Position Master provides ±0.001 accuracy on both long and cross slides, high precision ballnut lead screw in both long and cross slides and hard chrome ways, and measurement in both directions, long and cross, from a zero reference point. Flexibility is featured. The company has designed the package so it can be operated manually, semiautomatically, or automatically. The unit has manual milling controls. The optional features of third axis control and milling feeds permit complete automation of the entire milling operation.

The company estimates that under existing working conditions in vertical precision milling, the unit can reduce operational time by 90 per cent. It says a minimum amount of training is required to operate the unit—about 10 hours for trained machinists.

For further information, *write* Ultra-Sonic Precision Co. Inc., 234 Fourth Ave., Mt. Vernon, N. Y.



Unit Welds with Electron Beam

WELDING of various refractory and reactionary metals as well as dissimilar groupings is being done on this electron beam welder (Model VX-20-30-48).

The vacuum chamber is 20 in. wide by 30 in. high and 48 in. long. Complete gun mobility takes full advantage of the internal chamber dimensions.

The electron gun is provided with traverse motion (Y axis) and vertical motion (Z axis) powered by a speed and position servocontrol. The control (called Sciakydyne) also effects longitudinal motion (X axis) to the internal worktable. The manufacturer says the numerical control is easily adapted to the Sciakydyne control concept.

The vacuum chamber is pumped to 1 to 10^{-4} mm. Hg in about 4 minutes. The pumping sequence is automatic. With atmosphere conditions equal, both end doors can be opened. Also the 20 in. diameter front port opens to provide accessibility to the electron gun and work area.

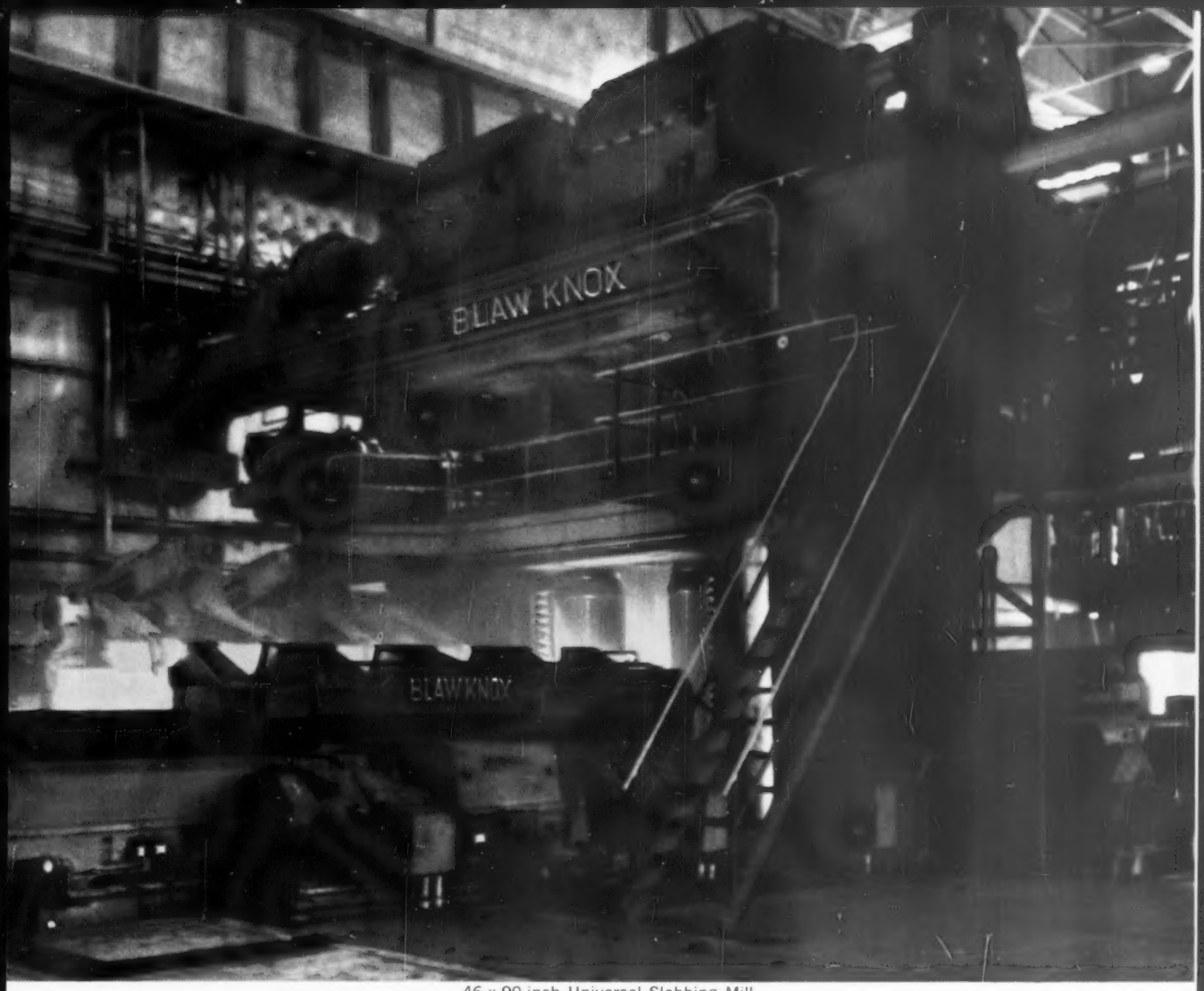
An electron beam of 350 milliamperes at 30 kv can be produced by the electron gun and power supply. The beam spot can be focused into a 0.030 in. minimum diameter and over 1.0 in. diameter maximum. The company says the low voltage system has successfully welded 1¾ in. aluminum plates with the depth to width ratio of 22 to 1.

For further information, *write* Sciaky Bros. Inc., 4915 W. 67th St., Chicago 38, Ill.

Press Brake Features Sensitivity, Accuracy

SENSITIVITY on the two speed, 30 ton, Pedersen brake is such that the operator can stop the ram within ±0.0005 in. A 10 in. stroke can quickly be set to exactly match each job and it can be reduced in length to less than 1 in. Full tonnage is available through the entire length of stroke and the ram may be bottomed without danger of jamming.

The speed change point of the



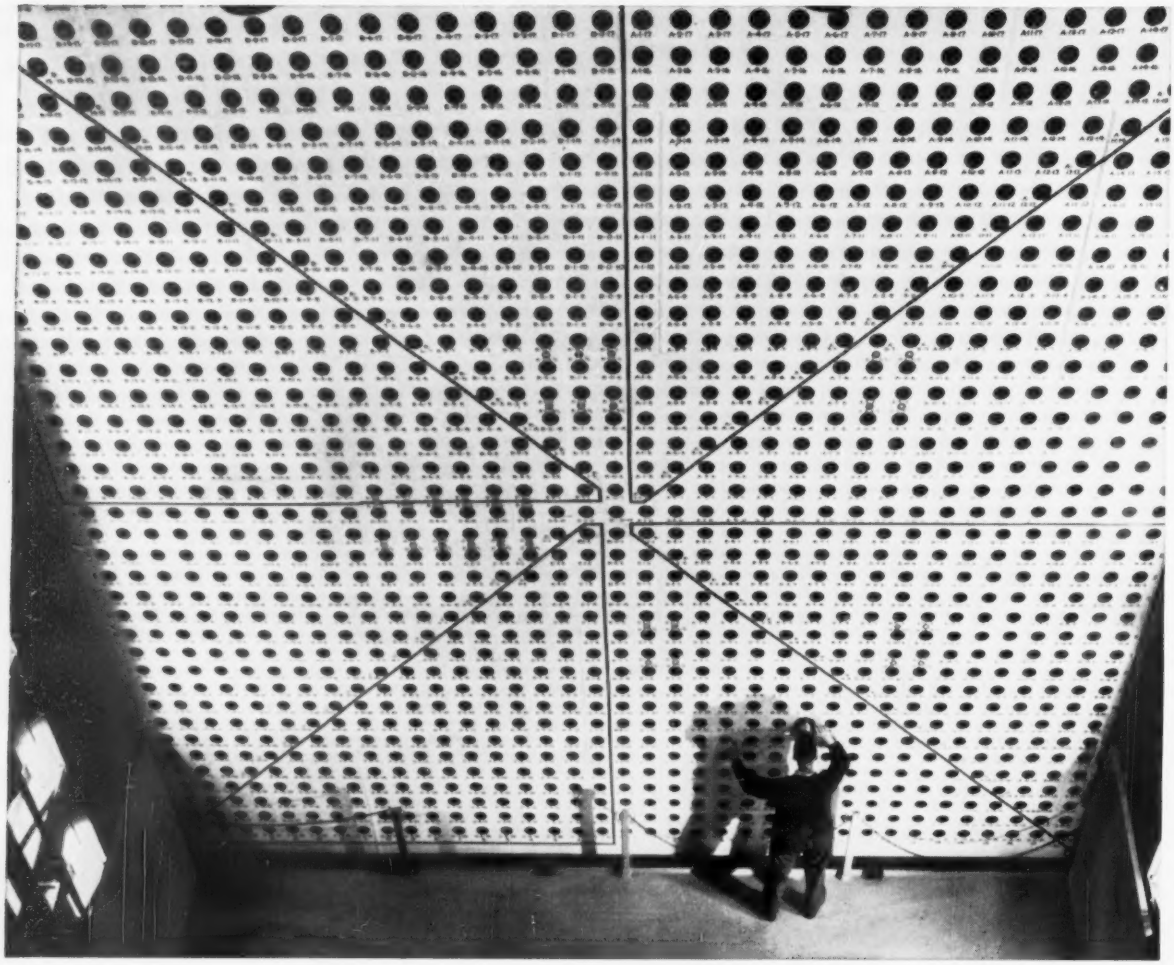
46 x 90-inch Universal Slabbing Mill.

BLAW-KNOX SLABBING-BLOOMING MILLS

Blaw-Knox designs and builds slabbing-blooming mills in a complete range of sizes in universal and high lift types. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals. Sheet and strip processing equipment. • Electrolytic tinning, annealing, and galvanizing lines. • Seamless pipe and tube mills. • Draw benches, and cold draw equipment. • Blaw-Knox Medart cold finishing equipment. • Iron, alloy iron and steel rolls. • Carbon and alloy steel castings. • Fabricated steel plate or cast-weld design weldments. • Steel plant equipment. • Heat and corrosion resisting alloy castings. • Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pa.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves



PRECISE TUBING HELPS CONTROL ATOMIC REACTOR

In the intense heat and radioactivity of nuclear reactors, there are many uses for precise tubing, manufactured under rigid quality control.

This is one of the many important applications for BISHOP'S complete line of tubing up to 1 inch OD, in stainless, nickel, super and exotic alloys—and glass-to-metal sealing alloys, clad metals and composite wires.

BISHOP also produces a vast line of platinum products and chemicals.

And BISHOP is unique because of its ability to *work these metals to such small, precise forms.*

Write for Bulletin No. 12, tubular products; or Catalog No. P-6, platinum products.

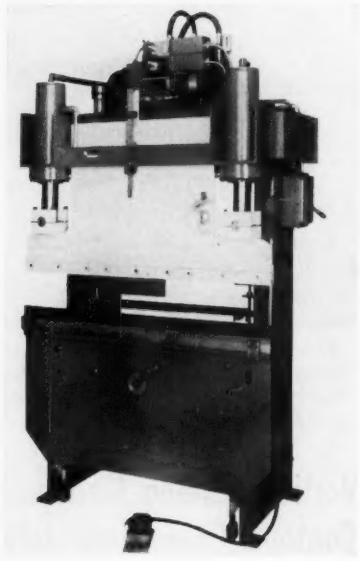
BISHOP

Tubular Products Division **J.BISHOP & CO.** *platinum works* MALVERN, PENNSYLVANIA

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

OFFICES: NEW YORK • PITTSBURGH • CHICAGO • ATLANTA • HOUSTON • LOS ANGELES

NEW **PRODUCTS** and equipment



brake can be conveniently adjusted for each job to take advantage of the fast advance and fast return.

The press does not have to complete a fixed cycle every time it starts downward. The ram can be inched up or down and stopped at any point (reduces the number of rejects due to improperly positioned parts, and also provides operator safety through the pedal controlled ram). A front operated back gage provides an accuracy of ±0.005 in.

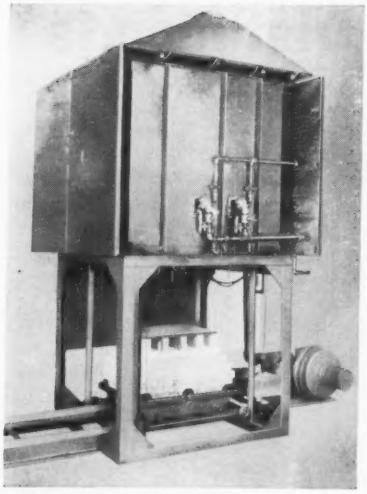
The company says that under normal operating conditions, strokes repeat their setting within ±0.0005 in. and the dies maintain attitude within the same figure. The press can be operated with the ram tilted ¼ in. in 4 in. in either direction.

For further information, *write* Pedersen Electronics, 3730 Mt. Diablo Blvd., Lafayette, Calif.

Furnaces Suitable for Testing and Production

TWO LINES of gas furnaces have been developed for applications ranging from laboratory testing to high volume production. The Standard Model GF Series is designed for continuous operation up to 3000° F. The GFHT Series will operate continuously up to 3300° F.

Once the gas and air ratio has been set at the burners, it is constant in every position, says the company. The GF series includes cabinet, elevator, and shuttle models and the GFHT series includes elevator and swing arch models. A range of setting space sizes is available in each series.



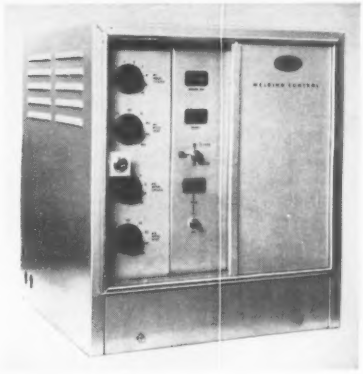
For further information, *write* Harrop Precision Furnace Co., 3470 E. Fifth Ave., Columbus 19, Ohio.

Welding Power Supply Has Half Cycle Switch

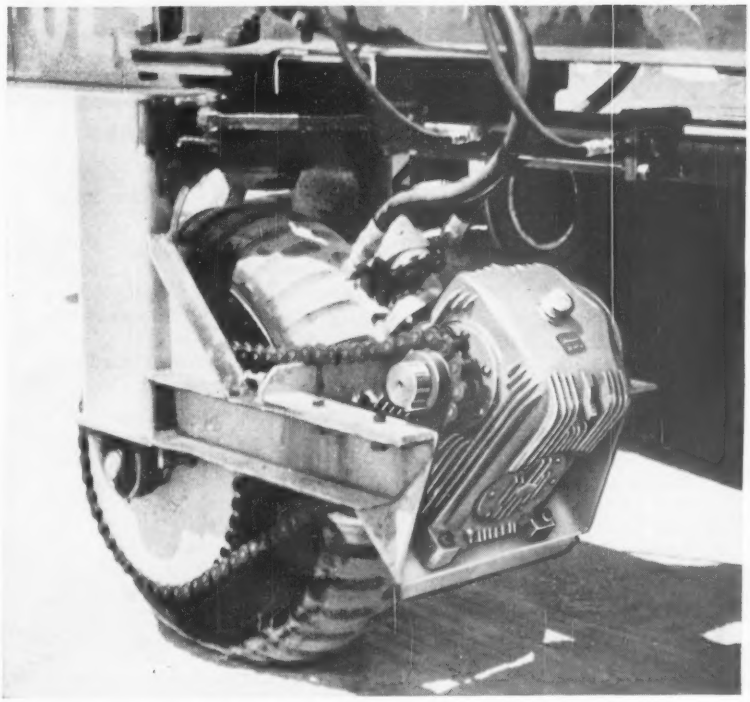
A COMPACT, ac welding power supply features a half cycle welding switch for use with single or dual synchronous timers.

The unit (WeldPower Model 2-156) has two Class A ignitrons mounted in inverse parallel with thyratron ignition control tubes, bias forming circuits, and a pulse transformer for firing the thyratrons.

When used with single or dual timers, the unit has a 0.5 to 10



(Advertisement)



STURGEON BAY, Wisc. Manufacturer solves drive problem for traveling crane by mounting hydraulic motor-driven speed reducer at wheel. Double-enveloping worm gear design permits compact unit necessary for application. Available from Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Michigan.

The Shortest Distance Is OVERHEAD

With Shepard Niles JOB-MATED Cranes

Traveling cranes deliver the goods **directly,** from point to point within your plant or warehouse, or even from one building to another.

They move masses of material faster, more efficiently–speed up production–because they travel **over** obstacles, not **around** them. And they leave passageways, work areas, and grounds free of moving equipment, with greater safety for your employees and materials.

Best of all, traveling cranes allow you to increase your useable storage capacity by eliminating aisles, and enabling you to store material up to the beams.

Shepard Niles JOB-MATED Cranes with auxiliary hoists are not merely handling devices, but versatile, highly engineered machine tools that contribute directly to increased production and profits. You'll find them ideally suited for your production and storage requirements. Write for complete details on how Shepard Niles JOB-MATED Cranes will improve your profit picture.

Member of Electric Overhead Crane Institute
America's Most Complete Line of Cranes and Hoists

SHEPARD NILES
CRANE AND HOIST CORPORATION
1162 Schuyler Ave., Montour Falls, N.Y.

cycle timing range and a 6 to 30 cycle timing range with the heat program timer. The half cycle directional timing switch limits current flow to 0.5 cycle in either direction when either the single or dual synchronous timers are set for 1 cycle weld time.

Special welding transformers for the unit come in three primary voltage ratings: 550, 440, and 220 volts (single phase, 60 cycles).

For further information, *write* Commercial Apparatus & Systems Div., Raytheon Co., 225 Crescent St., Waltham 54, Mass.

Vertical Turning Machine Contours Cones Accurately

PRECISE contouring of conical parts up to 30 in. in diameter with an accuracy of ±0.00015 in. is possible on a vertical turning machine developed by Frauenthal. The unit (Model 921) is equipped with a Frauenthal, dual axis, electrohydraulic tracer system. It has transistorized electronic control to guide vertical and horizontal travel simultaneously through 360 degrees of motion. It provides for constant stock removal speed on all surfaces of the workpiece.

The machine may be adapted to conventional boring, turning, and grinding. Tolerances as close as ±0.0001 in. are possible on straight workpieces.

A dual track recorder (optional) shows deflection, indicating immediately any variation from true path between template and work slide, providing a permanent record of all machining.

The 30 in. worktable is powered through direct current drive and a four speed transmission, offering variable potentiometer, controlled speeds from 12 to 1000 rpm. The company says this allows the maximum horsepower of the table drive to be obtained at four different table speeds. Result: Improved operation for a wider selection of types and sizes of workpieces.

Only one setup is needed for working any number of related surfaces. The vertical slide travels a

maximum of 36 in. The manual turret slide adjusts 3 in. A hydraulic servomotor-reducer provides the feed and rapid traverse. Feed rate varies from 0 to 2.5 in. per minute and the rapid traverse is 30 in. per minute.

For further information, *write* Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.

Permanent Magnet Resists Severe Environments

HIGH resistance to demagnetization is cited as a feature of a permanent magnet material called Alnico VIII. In addition, both the coercive force and maximum energy product are said to be substantially higher than Alnico VI or VII.

The properties make possible applications in severe temperatures and other environmental conditions.

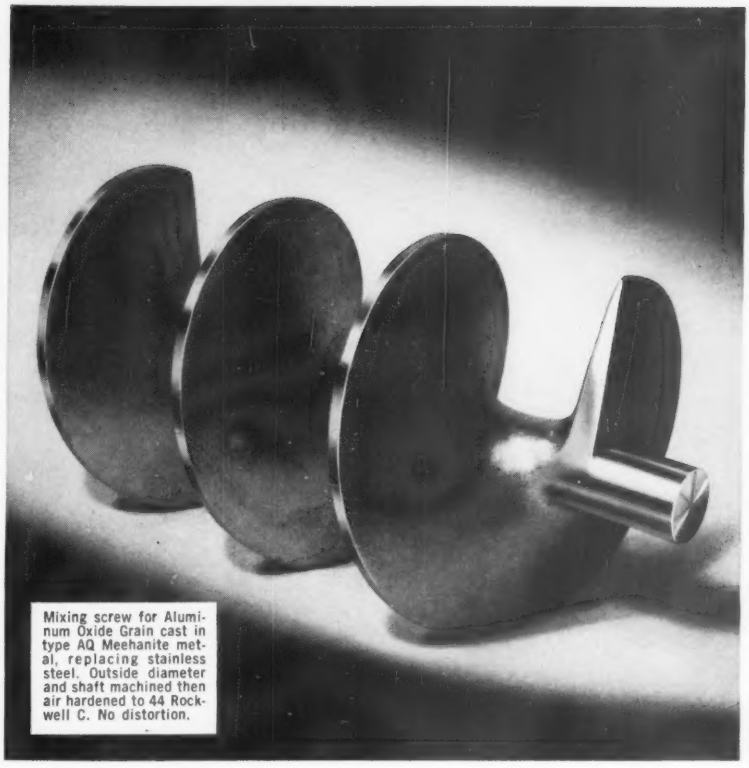
Typical applications include focusing of electron beams, magnetic separators, permanent magnet cores for meters, and flat type speaker structures.

For further information, *write* Dept. IS, Crucible Steel Co. of America, P. O. Box 88, Pittsburgh 30, Pa.

Coil Loading Buggy Speeds Production

A FLOOR type, coil loading buggy provides two production advantages for slitting lines and other lines receiving coiled material: 1. It's a fast and efficient means of accurately positioning coils on the uncoiler mandrel. 2. It allows for

MEEHANITE MEANS BETTER CASTINGS®



Mixing screw for Aluminum Oxide Grain cast in type AQ Meehanite metal, replacing stainless steel. Outside diameter and shaft machined then air hardened to 44 Rockwell C. No distortion.

New AQ Meehanite®
Air Hardens....No Distortion

This new wear and abrasion resisting type of Meehanite® is a low cost metal of extremely high hardenability that offers many performance and cost advantages. It is recommended for critical castings of varying section size that require a Brinell hardness over 400 and which must retain accurate dimensions.

Such castings, made in type AQ Meehanite which has an "as cast" hardness up to 280, can be machined first, if necessary, and then safely air hardened without the risk of cracking or distortion associated with water or oil quenching. Final hardness — up to 500 Brinell; tensile strength — 66,000 psi.

AQ Meehanite® can easily be locally hardened for improved wear resistance of working faces and edges of such parts as dies, punches, cams, sheaves, etc. Another advantage is that the hardness at elevated temperatures is considerably better than most engineering materials. Also, AQ Meehanite, because of its manganese content, exhibits considerable work hardening during service.

For more information about AQ Meehanite®, send for your free copy of our 4-page folder, B-48. Write to Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

MEEHANITE METAL

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

2 A.M....
but cost of possession never sleeps

The most dormant looking thing in the world is a pile of steel in storage . . . yet it is as active as a bucket of worms!

Your money is tied up . . . and costs go merrily on. High local taxes. Scrap losses from inefficient utilization of obsolete sizes or gauges of steel in inventory. Capital pinned-down by steel inventory could better be at work as income-earning investment.

Here's an ideal solution for most steel users . . .

Use the complete stocks of your nearby steel service center just as if they were your very own. Convenience and availability are augmented by other economies. Plus, of course, the variety of first-step processing services which many centers are tooled-up to provide.

To help your production and cost accounting people in figuring the true cost of steel stocks, ask your steel service center salesman for the booklet, *What's Your Real Cost of Possession for Steel?* Or write to Steel Service Center Institute.

COST OF POSSESSION . . . *to determine your own cost of possession for steel in inventory, consider all these factors:*

Cost of capital: inventory, space, equipment — Cost of operation: space, material handling, cutting and burning, scrap and wastage — Other costs: obsolescence, insurance, taxes, accounting.

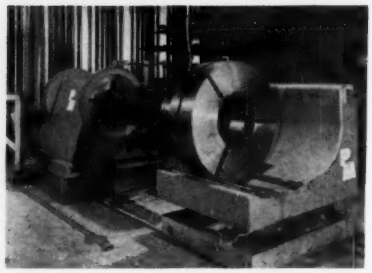
YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE
540-G Terminal Tower • Cleveland 13, Ohio

Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

STEEL SERVICE CENTER INSTITUTE

NEW PRODUCTS and equipment



storage of another coil (permitting it to be loaded whenever a crane or lift truck is available).

The unit is ready to go following connection to electrical power. Optional equipment includes heavy duty, blocker rolls set into the cradle to assist in the threading operation.

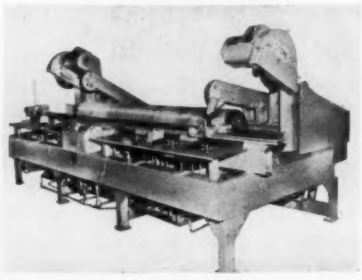
For further information, *write* Production Machinery Corp., Mentor, Ohio.

Rotating Pipe Cutter Features Size Flexibility

A ROTATING, pipe cutting machine has wide applications: It will cut pipe, round solids, and tubular extrusions of virtually any length and dimension. The initial machine in the series cuts size 10¾ in. OD x 9⅝ in. ID in less than 3 minutes. Using a 16 in. SNS 245 F abrasive wheel, a precise, square end cut was produced with no change in metal characteristics, says the company.

In other cutting tests, the unit sliced a 4⅝ in. OD x 4¼ in. ID nickel chrome alloy in 25 seconds, 8⅜ in. OD x 8 in. ID, 157 lb, cast iron in 32 seconds, and 8¾ in. OD x 8 in. ID steel tube in 1 minute. Other machines in the series provide for larger diameter stock.

The unit is equipped with a 10 hp, TEFC ball bearing, geared in



head motor at each end. The machine shown is 13 ft long, 6 ft wide, and weighs about 3 tons.

The centrally located control panel gives the operator complete electric and hydraulic control over each cutting head, rate of feed, elevation, depth of cut, speed, and direction of rotation.

Stock is held in position on opposing banks of self-centering, hard rubber faced, support wheels spaced the entire length of the machine and by pressure rollers near each cutting head. Accuracy is achieved by a spring loaded kerf follower directly under the cutting wheel at the base of stock.

For further information, *write* Stone Machinery Co. Inc., Manlius, N. Y.

Circuit Board Design Has Many Advantages

ADVANTAGES cited for a reinforced plastic circuit board include superior electricals, low loss factors, increased insulation resistance, and unusually low moisture absorption. The manufacturer says the copper clad laminate provides the high tensile, flexural, and impact strength of plastic reinforced with glass fiber at competitive prices.

The material, called Cimclad, is easy to process and cold punches well at room temperatures, says the company. It's said to be self-extinguishing.

For further information, *write* Cimastra Div., Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Car Bottom Kiln Handles Ceramics, Refractories

THE DEVELOPMENT and production of electrical ceramics, refractories, grinding wheels, porcelains, and other materials can be handled by the Lindberg car bottom, periodic kiln. Electrically heated, operation of the kiln is automatic.

The preset cycle can be changed or altered at any time (in firing or in cooling) after the cycle has started. The company says the design permits the use of closely con-

FIRST-STEP PRODUCTION

Cost-cutting benefit offered by your steel service center

First-step pre-delivery metalworking service is available from well-equipped steel service centers handy to you. By using their modern precision equipment, you reduce your part-time need for costly machinery.

Services which are available from steel service centers in your area include: burning, precision shearing, slitting, flame-cutting, sawing, leveling and edging.

Pre-delivery processing is backed by expert steel experience to help you operate economically, yet produce to high standards. Your "cost of possession" of steel is reduced, too. Call on your local steel service center for recommendations, service and delivery.

YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE
Terminal Tower • Cleveland 13, Ohio

Steel

Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

STEEL SERVICE CENTER INSTITUTE

It's the "*little things*" that pick the corporate pocket

IT'S the mark of a good executive to delegate authority. "Don't run a one-man show," the experts say. It is also the mark of a good executive to backtrack occasionally and check up on the results of delegated authority — particularly in those areas that may seem to require little executive judgment. These are the "little things" — *that count.*

Take, for example, the purchase of hand tools — wrenches, screwdrivers, impact sockets, pliers, etc. used on the production line or by the maintenance department. Just a routine buying job. You can pick 'em up anywhere — cheap.

But are they cheap? Poor-fitting tools cause accidents. Accidents cost money. Cheap tools damage screws, nuts, expensive parts. More cost. Cheap tools break easily, mean wasted time going back to the tool crib. More cost.

And with cheap tools, that's all you get — cheap tools. No advice, no benefit of an experienced sales engineer's tool and tool-use knowledge.

May we cite just a couple of examples of how top-quality SNAP-ON® tools sold by a SNAP-ON specialist saved these companies time and money.

Case A.

Impact sockets. SNAP-ON sales engineer inspected production line, suggested testing SNAP-ON power impact sockets along with brand then in use. *Result*: SNAP-ON sockets costing a few cents more handled ten times the work before showing wear. The company switched to SNAP-ON sockets, reports substantial savings.

Case B.

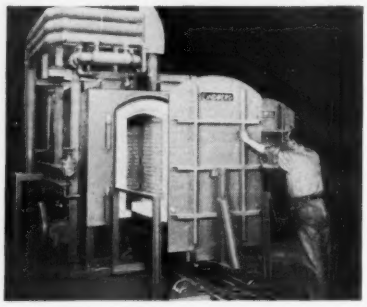
Tool kit for electronic assembly. SNAP-ON sales engineer inspected production line — recommended a special selection of tools to be purchased by employees. *Result*: There was such an improvement in work quality and output among SNAP-ON kit owners that the company arranged for every production employee to have a kit.

SNAP-ON Tools Corporation can cite hundreds of cases just like these, where qualified tool specialists recommended standard or special tools that resulted in faster production, greater safety, better work.

Perhaps hand tool purchasing is one of those "little things" that you or one of your associates should look into. If so, SNAP-ON would be happy to have a representative call and go over your hand tool program. Tools are a SNAP-ON representative's business — his only business. He can help you save money. Call your nearest SNAP-ON branch or write us, outlining your problem.

SNAP-ON TOOLS
CORPORATION
8121-G 28th Avenue • Kenosha, Wisconsin

NEW PRODUCTS and equipment



trolled, protective atmospheres. The working chamber is 21 in. wide, 60 in. long, and 36 in. high. A 1600 lb load can be cooled from 2500 to about 200° F in 8 hours.

For further information, *write* Kiln Div., Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, Ill.

Press Makes Quick Work Of Light, Bulky Materials

HIGH PRODUCTION of lightweight, bulky materials is cited as a key advantage of Havir's 16 ton Auto-Press. Speeds of 100 to 400 strokes per minute are standard. The bed is 11½ x 15 in. with a feed width of 8 in. The maker says it's ideal for material production of most metals, rubber, plastics, and paper. It's also claimed that die savings up to 50 per cent are made possible with the unit's cylindrical type ram design, fine parallelism, and safety shutoff. Single or double air clamped feeds can be used to make press operation automatic.

For further information, *write* Havir Mfg. Co., 444 N. Cleveland Ave., St. Paul, Minn.

Optical Measuring Tool Checks Difficult Jobs

INTERCHANGEABLE microscope or projection screen optics are featured on a large capacity, optical measuring instrument.

The unit has a long travel, precision co-ordinate stage and makes possible accurate measuring of large parts previously difficult to check by any method (such as internal

THIS
IS
WHY

Chromcraft

prefers the
ALLIS-CHALMERS
FT-20

More Power at the Drive Wheels
The FT-20 is the most powerful truck in its class. The extra power pays off every day on the steep ramp at Chromcraft Corporation in St. Louis.

Better Stability
Sometimes it is necessary to carry a load high to clear machines and materials. Balance and low center of gravity make the FT-20 first choice for this work.

Much Easier to Maneuver
The loading dock is narrow and busy at Chromcraft. Lift trucks must also work inside boxcars. The FT-20 can scoot and squirm through areas where smaller, less powerful, less maneuverable trucks can't follow.

Ask your Allis-Chalmers dealer to show you further proof that there's a Dollar-Saving Difference in Allis-Chalmers lift trucks. Allis-Chalmers, Milwaukee 1, Wisconsin. BH-165

ALLIS-CHALMERS

POWER
FOR A
GROWING
WORLD

diameters, depth of internal grooves, and internal radiuses and finishes).

Measuring capacity of the unit (Linearscope) is 4 x 12 in. in one setting. Direct micrometer readouts are 0.0005 and 0.0001 in.—with the "tenth" readings in the longitudinal (12 in. travel) direction.

In addition to the regular 20X or 40X monocular microscope eyepiece with crosshair reticule and integral vertical illumination, a 3 x 3 in. projection viewing screen with a separate, high intensity illuminator is available for rapid production checking. The projection optics range from 5X to 50X. You can obtain 3D stereo and zoom optics for special applications and close visual inspection of chambers, blind holes, internal diameters, and surface conditions.

For further information, *write* Stocker & Yale Inc., 194 Green St., Marblehead, Mass.

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TWO modular mixing attachments for Plasmadyne's 300 kw arc plasma generator are intended for the creation of environments for reentry testing of materials, heat transfer and gas dynamic evaluations of high temperature gases and plasmas, and for chemical synthesis investigations, magnetohydrodynamics studies, and plasma jet thrust investigations.

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The AM-4 and the AM-5 nozzles are interchangeable. Both mount on the front of Plasmadyne's MM4-3 mixing module. In addition, a mounting bolt circle is available for attaching the unit to test chambers. Provision for O-ring sealing is included.

For further information, *write* Plasmadyne Corp., a subsidiary of Giannini Scientific Corp., 3839 S. Main St., Santa Ana, Calif.

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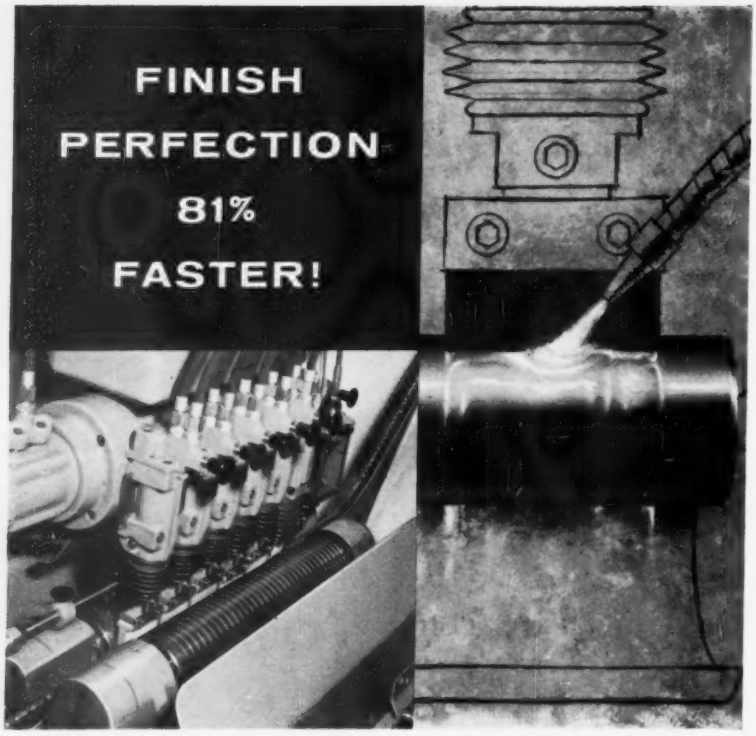

Model 88 Through-Feed Centerless Microstoning Machine for automatic production and Microstoning head of the Model 9681 Microstoner, for attachment to lathes and other machine tools.

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NEW literature

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Self-Sealing Couplings

The answers to many questions about self-sealing couplings in fluid piping systems are presented in Bulletin No. 629. Advertising Dept., Aeroquip Corp., Jackson, Mich.

Turk's-Head Applications

Case histories on turk's-head, adjustable draw plates are included in a bulletin. Fenn Mfg. Co., Fenn Road, Newington, Conn.

Brushing Nomenclature

A system of standard nomenclature for construction of industrial brushing tools consists of 14 illustrated pages. It's intended to reduce misunderstanding between users and producers in specifications. American Brush Manufacturers Association, 1900 Arch St., Philadelphia 3, Pa.

Mercury Vapor Lamps

Facts about mercury lamp life and maintenance, lamp construction, and a chart on lumen output are included in a booklet. Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J.

NEW BOOKS

Powder Metallurgy, edited by Werner Leszynski, Interscience Publishers Inc., 250 Fifth Ave., New York 1, N. Y., 847 pages, $25

Papers presented at the International Powder Metallurgy Conference (New York, June 13-15, 1960) are presented in this volume. The mechanism of sintering, dispersion strengthening, technology and methods, and materials and applications are covered. The contributors represent many domestic and foreign colleges, universities, institutes, research groups, and companies. The conference was held under the joint sponsorship of the Metal Powder Industries Federation and the Powder Metallurgy Committee of the Institute of Metals Division of the Metallurgical Society of AIME.

High Strength Steels for the Missile Industry, edited by H. T. Sumsion, American Society for Metals, Metals Park (Novelty), Ohio, 276 pages, $12

Papers presented at a symposium at the Golden Gate Metals Conference, Feb. 4-6, 1960, in San Francisco are incorporated in this book. Topics include materials and fabrication problems in pressure vessels, stress corrosion of aircraft and missile steels, fracture theory in pressure vessels, pressure vessel reliability, NASA's program —high strength sheet alloys, and future applications of high strength steels.

ASM Review of Metal Literature, 1960 Vol. 17, edited by Marjorie R. Hyslop, American Society for Metals, Metals Park, Novelty, Ohio, 1342 pages, $25

The review contains 11,903 annotations of articles, technical papers, reports, and documents appearing in journals and books during 1960. It's divided into 20 sections covering different areas of materials and process engineering and technology, and includes addresses of publications as well as comprehensive subject and author indexes.

Effective College Recruiting, George S. Odiorne and Arthur S. Hann, Bureau of Industrial Relations, University of Michigan, Ann Arbor, Mich., 288 pages, $5

Practical suggestions for recruiting college graduates for jobs are presented. Based on research conducted by the Bureau of Industrial Relations at the University of Michigan, the book consists of a study of the underlying manpower economics of college recruiting, a survey of the literature in the field, a study of planning strategies for company recruiting, on-campus tactics, standards used, and some hints on understanding college students. It reports on an analysis of 134 company recruiting brochures and spells out the procedures of a typical placement department of a large university.

X-Ray Metallography, A. Taylor, John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y., 993 pages, $27

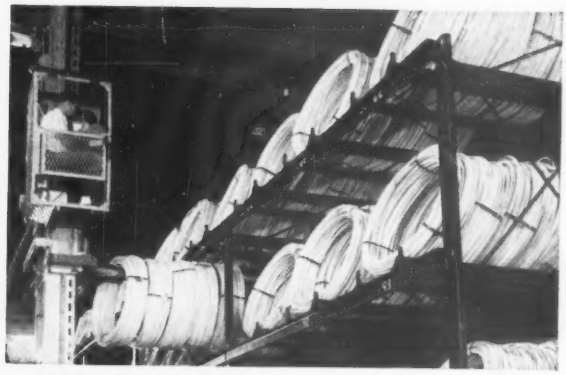
Main theme in this book is the application of x-ray techniques to the study of metals and their alloys. It also includes references to analogous neutron and electron diffraction procedures. Along with basic theory, a detailed description is given of the apparatus and experimental procedures required in the solution of real problems.

1960 *Supplement to ASTM Book of Standards, Including Tentatives*, American Society for Testing Materials, 1916 Race St., Philadelphia, Pa., ten parts, $3.25 each to members and $4 to nonmembers

Users of ASTM specifications will want to check the supplements to avoid possible confusion. The 1960 Supplements represent the final changes for the 1958 Book of Standards. They will be incorporated, with any other changes, in the 1961 Book of Standards of the ASTM when it is issued.

Industrial Furnaces, Vol. 1, Fifth Edition, W. Trinks and Matthew Mawhinney, John Wiley & Sons Inc., 440 Park Ave. S., New York 16, N. Y., 486 pages, $17

Basic principles of furnace design and operation are discussed and brought up to date. This reorganized fifth edition contains a separate chapter on the theory and calculation of heat transfer within a furnace enclosure, including radiation and convection transfer to and from furnace gases. Also included is an expanded treatment of the capacity of modern forced convection furnaces and of modern axial heating furnaces. Charts have been extensively revised to reflect new findings and design methods.



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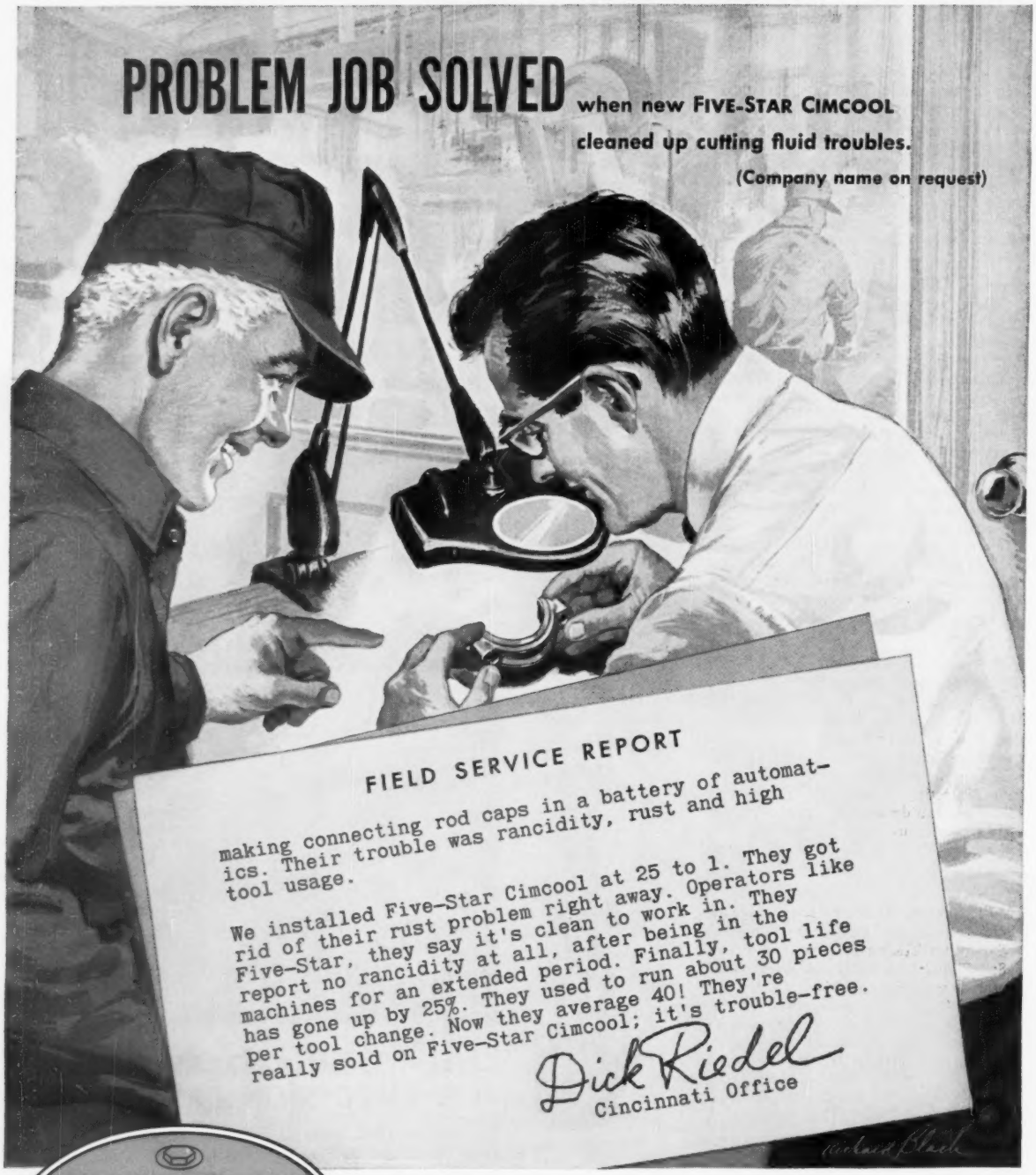
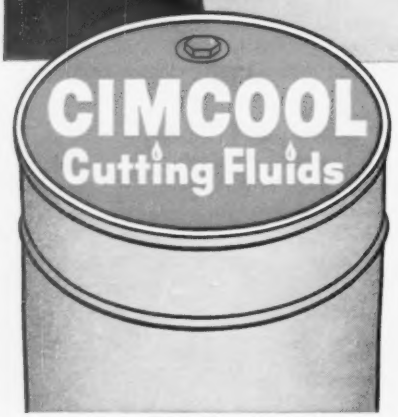

FIELD SERVICE REPORT
making connecting rod caps in a battery of automatics. Their trouble was rancidity, rust and high tool usage.
We installed Five-Star Cimcool at 25 to 1. They got rid of their rust problem right away. Operators like Five-Star, they say it's clean to work in. They report no rancidity at all, after being in the machines for an extended period. Finally, tool life has gone up by 25%. They used to run about 30 pieces per tool change. Now they average 40! They're really sold on Five-Star Cimcool; it's trouble-free.
Dick Riedel
Cincinnati Office



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Small Gains Seen for August

LOOK FOR a 3 to 5 per cent upturn in steel production next month even if automotive demand falls short of original estimates. Ingot output should approach 8.3 million tons—surpassing the 8 million tons estimated for July but failing to equal June's 8.5 million.

PROS AND CONS—That's the view held by steelmakers in Cleveland, Pittsburgh, and the East. Some Eastern mills are so confident that they're saying August production will unquestionably exceed July's and may even surpass June's. They're encouraged by signs of better demand for cold rolled sheets, bars, plates, and structurals.

In Chicago, as STEEL reported last week, the outlook isn't so rosy. Some mills there estimate that their July and August automotive tonnage will be off 40 to 50 per cent from May and June levels. One company says its August business will certainly be less than July's. At mid-July, it had sold less than 40 per cent of the August tonnage it had hoped to book.

AUTOMOTIVE DEMAND OFF—The slump in the Midwest can be traced primarily to automotive model changeovers. Studebaker-Packard Corp. and Cadillac Motor Car Div. of General Motors Corp. have suspended production. GMC's Buick-Oldsmobile-Pontiac Assembly Div. started phasing out 1961 models last week. Chrysler Corp. will start shutting down this week. American Motors Corp. and GMC's Chevrolet Motor Div. will go down in the first week of August, Ford Motor Co. by August's third week.

SLOW STARTUP FOR AUTOS?—GMC's Fisher Body Div. has been telling some mills that it ordered more steel for July and August than it should have. August requirements of GMC's car divisions have been firmed up and are smaller than Fisher expected. Result: The firm must balance its inventories by cutting back in September. It may take only 60 per cent of the tonnage that it originally planned to order. Other automakers are reportedly running into the same difficulties, so it's possible that automotive steel shipments will be lower in September than in August.

STEELMAKERS UNDAUNTED—Despite the uncertainty about automotive requirements, most steelmen are confident that fourth quarter demand from the car companies will be strong. Reasons: 1. The inventory of unsold cars (920,000 vs. 1,065,000 a year ago) is small enough to pose no problem. 2. Strength in the used car market presages strong demand for the new models.

DISTRIBUTORS OPTIMISTIC—Steel service centers did 15 to 20 per cent less business in the first half of 1961 than in the corresponding period of 1960, says the Steel Service Center Institute, but its members are almost unanimous in predicting that the second half, 1961, will be 10 per cent better than the first half. Robert G. Welch, executive vice president of the institute, believes the industry's 1961 shipments will be up moderately from the 6,150,000 tons shipped last year.

PRODUCTION STEADY—Look for ingot production in the week ending July 29 to be on a par with the 1,850,000 tons that STEEL estimates the industry poured in the week ended July 22. Output then was 0.5 per cent below the previous week's.

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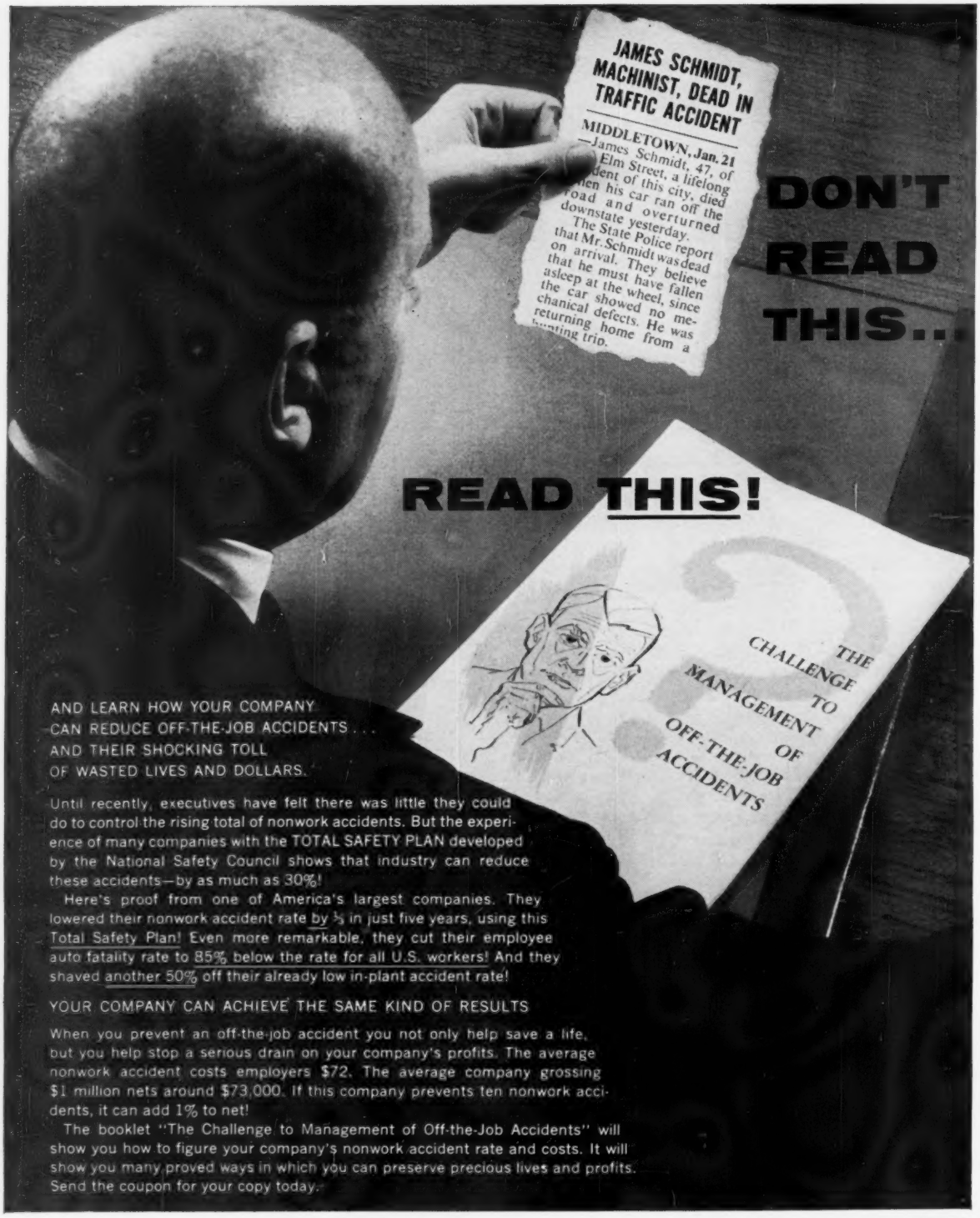
*Current prices were published in the July 17 issue and will appear in subsequent issues.


JAMES SCHMIDT, MACHINIST, DEAD IN TRAFFIC ACCIDENT
MIDDLETOWN, Jan. 21 —James Schmidt, 47, of Elm Street, a lifelong dent of this city, died hen his car ran off the oad and overturned downstate yesterday. The State Police report that Mr. Schmidt was dead on arrival. They believe that he must have fallen asleep at the wheel, since the car showed no mechanical defects. He was returning home from a hunting trip.
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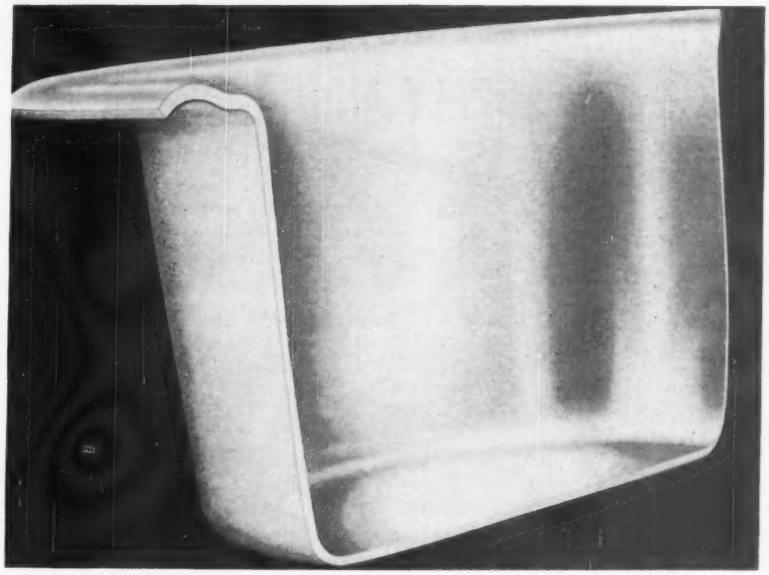
Stainless, Aluminum Join Forces

ALUMINUM AND STEEL makers have taken another step down the road to peaceful coexistence.

Composite Metal Products Inc., Washington, Pa., and Fairmont Aluminum Co., Fairmont, W. Va. (a subsidiary of Cerro Corp.) have combined the conductivity, lightness, and ductility of aluminum with the strength, corrosion resistance, and beauty of stainless in a stainless clad aluminum which holds promise for a wide range of products (examples: electric frying pans, auto bumpers).



Stainless clad aluminum, rolled by Fairmont Aluminum Co., can stand fairly severe drawing—such as the 45 to 50 per cent draw in the blank above—without any separation in the bonding area. The stainless clad (10 per cent) is on the inside

• **New Metal**—John B. Ulam, president of Composite Metal Products and originator of the process, declares that the clad material is, in a sense, a new metal with properties not found in either of the two metals alone. "For instance," he points out, "the tensile strength of 1100 annealed aluminum normally goes to a maximum of about 15,500 psi. Cladding it with stainless, the tensile strength goes up to 20,000 or 30,000, depending on the thickness of the stainless. And 3003 annealed alone goes to a maximum of 19,000, but with cladding it can reach about 35,000."

Mr. Ulam explains that his process is basically the same as the ones he has developed for cladding several other dissimilar metals. (Allegheny Ludlum Steel Corp. uses his basic patents in producing several clad metals.) "Of course, every time you change metals, you have to alter the process a bit," he states. Secret of the new product lies in the alterations.

• **What It Is**—Stainless clad aluminum is a molecular bonding of 300 or 400 series stainless (mostly 302 and 304) to any aluminum alloy (mostly 3003 and 1100). It is normally a 10 per cent cladding, and the sheet can be single or double armored, depending on the end use. Emphasis now is on single armor. It has a high strength to weight ratio—less than half the weight of stainless alone in comparable gage and strength.

It can be formed easily. Anybody who has the equipment and know-how to form either aluminum or stainless separately can use the new material with only slight modifications in equipment—especially cutting tools — and procedures. Mr. Ulam says that, generally, the practices for forming stainless are followed rather than those for aluminum.

• **Product Development** — Stainless clad aluminum is almost a natural for the pots and pans business, and it is making its greatest headway there. At least four makers of electric frying pans have placed orders with Fairmont for market samplings. "The new fry pans will not be cheap," comments Robert Farrell, president of Fairmont. "The price differential between stainless clad aluminum and straight aluminum in the same gage is about 3 to 1. But you can use a lighter gage of the new metal than you would for aluminum alone. One of the main attractions of the clad material is that the housewife will be able to clean the stainless inside surface of the pan more easily, and it will not pit."

But pots and pans will not be the only uses. Both Mr. Ulam and Mr. Farrell agree that in many places where the two metals are used alone, there will be a potential for stainless clad aluminum. Some possibilities they see are in curtain wall construction, milk cans, tanks of all kinds, sections of missiles, electronic applications where good strength-weight ratio and corrosion resistance are essential, liquid oxygen containers in cryogenics, architectural trim, auto trim, mobile homes, trucktrailers, railroad freight cars, top of range griddle plates, and irons. "Someone has even made inquiries about its use for auto bumpers." Mr. Farrell smiled.

• **Availability**—Fairmont is Composite's only licensee at the moment. The aluminum sheet pro-

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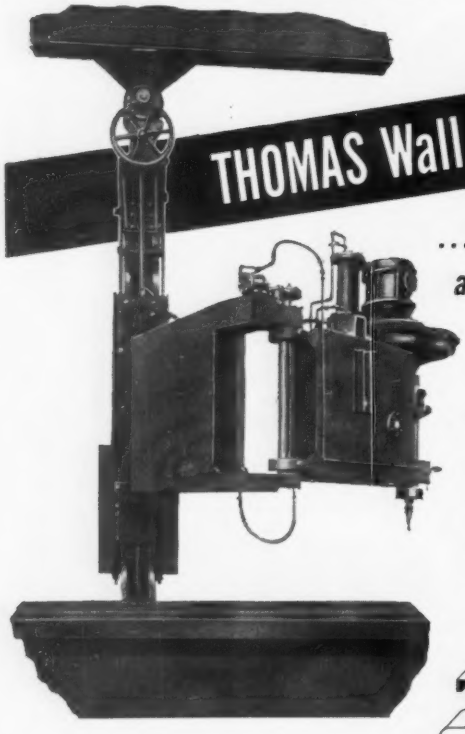

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ducer is quoting six to eight week delivery. Production is somewhat limited, but Fairmont is currently studying plans to meet anticipated demand. Initially, size range is 0.040 to 0.125 in. thickness with maximum width of 20 in. However, Mr. Farrell states that those ranges are not fixed and may grow in response to consumer demands.

The field is expected to open up a bit later this year when Aluminum Co. of America goes into production of a similar product which Alcoa says is still in the experimental stage. It too is described as a metallurgical bond produced by rolling. It is reported that Alcoa will produce the strip and sheets at its Alcoa, Tenn., plant.

Jessop Hikes Prices on Some Stainless Grades

Base price increases of 5 to 7 per cent on certain grades of chrome-bearing stainless steel were announced last week by Jessop Steel Co., Washington, Pa. It was also indicated that prices on other stainless grades might be advanced shortly.

Last week's increases were on grades produced at Jessop's principal plant at Washington and by its largest operating subsidiary, Green River Steel Corp., Owensboro, Ky.

Type 403 prices were raised 5 per cent and a 3 cents per pound quality differential was restored. Type 410 prices also were increased 5 per cent, while Type 501 and Type 502 went up 7 per cent.

Frank B. Rackley, president, attributed the price increases to rising costs. He said that while the company operated profitably in the first six months of this year, increases in raw materials and manufacturing costs were "catching up with us and it has become an economic necessity to raise prices."

Jessop's base prices have been higher than those quoted by some of its competitors but Mr. Rackley said sales were not affected.

Stainless Steel . . .

Stainless Steel Prices, Page 136

Crucible Steel Co. of America, Pittsburgh, has withdrawn its recent increase of about 2 per cent in prices of nickel bearing, stainless

steel products (STEEL, July 10, p. 97).

Service centers in the Los Angeles area are hopeful that mills will adjust the 10 per cent functional discount now available to all qualified distributors. They are distressed at the drop in gross profits on stainless steel from 8 to 3 per cent in the last three months. Leading service centers claim that the unstable price situation in stainless has been fostered by brokers who carry little or no inventory and are entitled to the same 10 per cent discount as well stocked warehouses.

Steel Bars . . .

Bar Prices, Page 132

Bar consumers are resuming operations generally a few points higher than they were before vacation shutdowns. Slightly more orders for August shipment are being booked. Some of the buying is to replenish low inventories, although many users admit that availability of tonnages for prompt shipment will not stimulate stock buying at the present rate of consumption.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 133

Order backlogs for reinforcing bars are fair and will sustain present production schedules through the third quarter. Highway construction continues active throughout the country, involving considerable tonnages of reinforcing material.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 133 & 134

Sheetmakers are paring their forecasts for August and September because automotive demand is less than expected. Even if a strike in the auto industry is averted, the car companies won't move into full production of 1962 models as quickly as they had anticipated. Fisher Body Div., General Motors Corp., says it overbought for July and August and must balance its inventory by cutting back steel receipts in September. It may take only 60 per cent of the tonnage that it originally planned to order. Other automakers are reportedly running into the same difficulties, so it's possible that automotive steel shipments will be lower in September than in August.

Elsewhere, the outlook is more

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favorable. As plant vacations end, consumption is gradually picking up. Demand from service centers and miscellaneous buyers is well sustained. Result: Sheet producers expect their August shipments to be larger than those in July, but not as high as those in May or June.

Demand in New England for cold rolled strip is more active than for sheets with the exception of galvanized. But strip mills are operating under 60 per cent of capacity on the average with high carbon grades slightly ahead of low carbon. Some consumers of carbon sheets have sold from inventory at lower prices. Included are grades and sizes bought months ago and tonnage not now usable and which might be classified as surplus.

Plates . . .

Plate Prices, Page 132

Outlook for plates is dimmed by the low volume of fabricated work being estimated for the balance of the year. Weldment producers have only light machine tool business on their books, and the meager demand for plates includes a small volume of heavy gages.

Plate shops have low backlogs (in some instances the smallest in years) and are placing mill orders only as they book fabricated work. Consumers are not likely to do much forward buying until mill shipments are more extended. Shipyards will take in more plate tonnage in the fourth quarter than they did in the two previous quarters.

Alaska will receive bids at Juneau July 28 for propulsion machinery to equip three, twin screw, 352 ft passenger and automobile ferries, to serve Southeastern Alaskan ports. Bids involve generator sets and other machinery. Probably 1000 tons of plates and shapes are involved in this project.

Tubular Goods . . .

Tubular Goods Prices, Page 136

National Tube Div., U. S. Steel Corp., has discontinued the special 4 per cent discount on tubing and casing that it offered distributors on shipments into their warehouse stocks.

Other tubular goods producers are expected to announce similar action to remain competitive.

The discount went into effect May 26 and was intended as an inducement to distributors to increase their inventories. Instead, they gave part or all of the 4 per cent to customers in an effort to get more business. Result: Major oil companies bought from them at prices 4 per cent lower than they would have paid for direct mill shipments.

On July 12, National Tube restored normal price relationships by rescinding the special discount and cutting prices of tubing and casing at its mills in Lorain, Ohio, and McKeesport, Pa., by 4 per cent. The company did not change its prices on drill pipe, nor did it withdraw the special 4 per cent warehouse discount on that product. The regular 6 per cent distributor discount continues unchanged on all oil country goods.

While the special discount was in effect, major oil companies loaded up on tubing and casing. June ship-

ATTENTION STEEL PRODUCERS and FABRICATORS

QUITE A FEW OF YOUR COMPETITORS ARE DESCALING THEIR SHEETS, BILLETS, WIRE AND PIPE AT A LOWER COST THAN YOU ARE . . . SIMPLY BECAUSE THEY'VE CHANGED TO METAL BLAST's

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MANUFACTURERS ALSO OF TOP QUALITY "SEMI-STEEL" SHOT AND GRIT MALLEABLE AND CHILLED SHOT AND GRIT AT COMPARABLE SAVINGS!

ments of a leading oil country supplier exceeded the previous month's by 25 per cent. July is shaping up as a month of inventory digestion.

Although mill shipments to consumers will be low, shipments to downriver stocks will be substantial.

Distributors . . .

Prices, Page 137

Atlantic Steel Co., Atlanta, has available through its Warehouse Div. a line of steel tubular products. J. A. Hurst has been named manager of the newly organized Tubular Products Sales Dept. The firm stocks more than 900 sizes and gages of carbon steel seamless, welded, mechanical and boiler, condenser, and hydraulic tubing, as well as structural square and rectangular welded tubing. These stocks are in addition to the full range of service center products normally carried.

The seasonal slump in steel service center business has been smaller than usual. So far this month, bookings have maintained a level close to that recorded in May and June. Demand is especially brisk for galvanized coils which are harder to obtain than most other products. Inventories are well balanced and ample for current needs.

Steel Ingot Production Tends Slightly Downward

STEELMAKING operations are not as brisk as they were in May and June. Failure of the automotive industry to buy as heavily as had been anticipated has created uncertainties about the outlook for the steel industry. Some steelmakers estimate that July and August automotive tonnage is off 40 to 50 per cent from that in May and June. The drop had been attributed wholly to model changeovers, but there is a suspicion now that assembly projections are being shaved.

STEEL estimates production for the week ended July 22 at 1,850,000 tons, a drop of 0.5 per cent from the preceding week.

• **Pittsburgh** — Steelmaking has reached a plateau on which it's likely to remain until late August. Operations here in the week ended July 22 were equivalent to 60 per cent of 1960 capacity, up 4 points from the previous week's rate. Steel sales executives are dismayed by reports that automakers won't begin volume production of 1962 model cars as rapidly as had been expected. The car companies will have to use up some of the surplus steel they've accumulated before placing new orders.

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta district dropped about 8 points during the week ended July 22 to 67 per cent of 1960 capacity.

• **Youngstown** — Steel ingot production eased 1 point during the week ended July 22 to 51 per cent of 1960 capacity. Youngstown Sheet & Tube Co. dropped one open hearth at its Campbell (Ohio) Works and one at its Brier Hill Works, Youngstown. Republic Steel Corp. added one open hearth to the active list and added one turn on its bessemer converters.

• **Buffalo**—Operations are holding steady here at about 44 per cent

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of 1960 capacity. Some steelmakers look for an upturn in demand in August and a gradual rise in production; others think August will be no better than July.

• **Chicago** — Steel production was scheduled to drop another point or two in this district during the week ended July 22. Mills are gearing their operations to the reduced order volume.

• **Denver** — Colorado Fuel & Iron Corp. has placed in operation its basic oxygen steel plant in Pueblo, Colo. Hourly capacity: About 100 tons of molten metal.

• **Los Angeles**—The Western district operating rate for the week ended July 22 is estimated at 77 per cent of 1960 capacity. No changes, or only fractional losses, were registered by leading mills.

Steel Poured in 1st Half, '61, Tops Last Half, '60

Production of ingots and steel for castings in June totaled 8,980,626 net tons, bringing output for the second quarter of the year to 25,116,313 tons, and for the first half to 44,857,804 net tons, reports the American Iron & Steel Institute.

June production was up 15.5 per cent compared with that in June, 1960 (7,404,873 tons). The second quarter's total was 27.2 per cent above that in the first quarter of this year (19,741,491 tons), but was down slightly from the 26,013,202 tons produced in the second quarter of last year.

The first half total was 16.4 per cent greater than output in the last half of 1960 (38,527,560 tons), but was down sharply from the 60,754,095 tons poured in the first six months of last year.

The institute's index of steelmaking in the first half of this year was 93.1 (average production in 1957-59 equals 100). That compared with 78.7 during the last six months of 1960 and 125.4 in the first half of 1960. The index figure for the second quarter this year was 103.7 vs. 82.4 in the first quarter, and 107.4 in the second quarter last year. The June index was 107.1 vs. 109.9 in the preceding month, and 92.7 in June a year ago.

Steel Ingot Production—June, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February	5,347,458	68,138	225,963	597,539	6,239,098	83.7
March	6,068,244	75,694	281,698	660,753	7,086,389	85.9
1st Quarter	16,955,602	193,441	720,916	1,871,532	19,741,491	82.4
April	6,551,518	65,503	269,991	697,675	7,584,687	95.0
*May	7,743,927	79,758	342,251	814,690	8,980,626	108.9
†June	7,382,000	85,000	324,000	760,000	8,551,000	107.1
†2nd Quarter	21,677,445	230,261	936,242	2,272,365	25,116,313	103.7
†1st Half	38,633,047	423,702	1,657,158	4,143,897	44,857,804	93.1
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	123.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.0
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,526,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
Nine Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,306,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

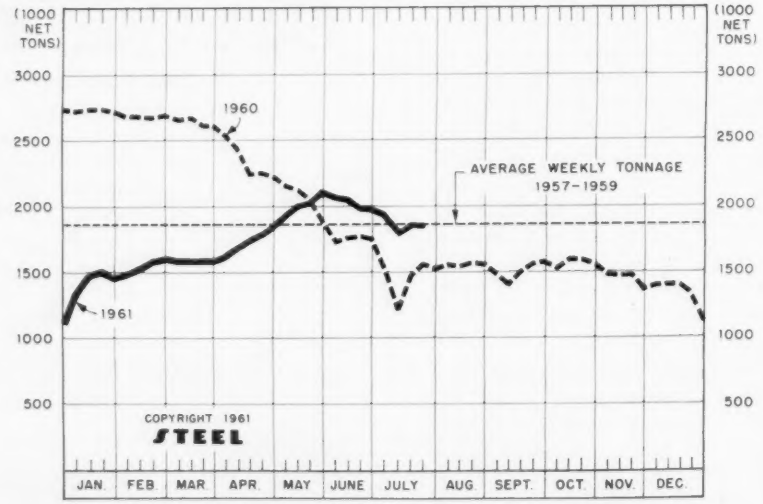
*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

STEEL INGOT PRODUCTION

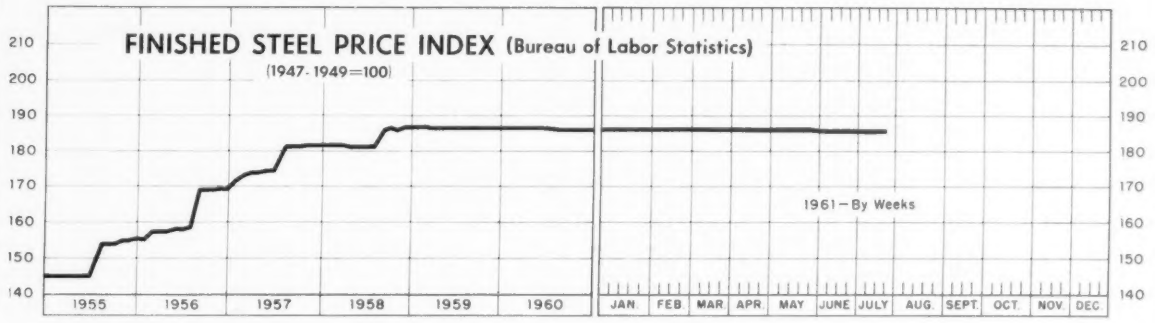
Weeks Ended	Net Tons	Change
July 22	1,850,000*	— 0.5%
July 15	1,860,000	+ 4.6%
July 8	1,779,000	— 7.6%
Totals to July 15		
1961	48,710,000	—22.8%
1960	63,065,000	

DISTRICTS	Week Ended —July 15— Tons‡	Index†	Week Ended July 8 Index†
Northeastern	253,836	95	85
Buffalo	78,858	81	80
Pittsburgh	355,123	88	82
Youngstown	149,583	88	74
Cleveland	101,855	110	106
Detroit	125,900	120	125
Chicago	396,521	106	111
Cincinnati	84,454	112	105
St. Louis	54,652	104	80
Southern	121,404	112	105
Western	137,957	118	116
Industry	1,860,000	99.8	95.5

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



July 18, 1961	Week Ago	Month Ago	June Index	Year Ago
185.5*	185.5*	185.4	185.4	186.2

*Revised due to change in weighting structure.

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended July 18

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	193.030
		Casing, Oil Well, Alloy (100 ft)	302.600
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (85 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	July 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

	July 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$131.27
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.84
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.96
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.45
Steelmaking Scrap, GT	37.00	37.00	37.83	31.67	46.50

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	July 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.36
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	July 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$62.25
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	57.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tonst.	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$35.50	3$5.50	$36.50	$30.50	$44.50
No. 1 Heavy Melt, E. Pa.	39.00	39.00	39.50	34.00	49.00
No. 1 Heavy Melt, Chicago	36.50	36.50	37.50	30.50	46.00
No. 1 Heavy Melt, Valley	38.50	38.50	38.50	33.50	45.50
No. 1 Heavy Melt, Cleve.	35.50	35.50	35.50	31.50	43.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	29.50	42.50
Rails, Rerolling, Chicago	58.50	58.50	58.50	49.50	67.50
No. 1 Cast, Chicago	41.50	41.50	42.50	40.50	45.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, July 19, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 133; footnotes, page 135.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 .....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.San Francisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3.....7.20
Minnequa,Colo. C10 .....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2...6.50
Sterling,Ill.(1) N15 .....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2....5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W. Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 ..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 .....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 .....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa., S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg.O4 .....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 .....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 .....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30...11.75*

Alloy

Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ..7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ....8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025

Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ...5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(DirRolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14 7.525
Sharon,Pa. S3 .....7.525
SparowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ...6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 .6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.225	7.425
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Enameling

Ashland,Ky A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 ....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ..6.975•
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875•
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625•
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw&Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S37 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Corp.

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.425
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.425
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale,Ill. A1	7.425
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown Y1	7.425
Youngstown S41	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.55
Youngstown S41	15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75
ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

Tin Plate,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.35	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

Fully Processed	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. $Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md.(10) B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.075
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.20
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.20
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	....17.15
Monessen,Pa. P16	....17.15
Roebling,N.J. R5	.....17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	.....12.35
Baltimore T6	.....12.65
Boston T6	.....12.65
Buffalo W12	.....12.35
Chicago W13	.....12.45
Cleveland A7	.....12.35
Crawfordsville,Ind. M8	.12.35
Dover,O. G6	.....12.35
Evanston,Ill. M22	.....12.45
Farrell,Pa. S3	.....12.35
Fostoria,O. S1	.....12.35
FranklinPark,Ill. T6	..12.45
Kokomo,Ind. C16	.....12.35
Massillon,O. R8	.....12.35
Milwaukee C23	.....12.55
Monessen,Pa. P7, P16	..12.35
NewCastle,Pa. M23	...12.35
Palmer,Mass. W12	.....12.65
Pawtucket,R.I. N8	.....12.65
Philadelphia P24	.....12.65
Riverdale,Ill. A1	.....12.45
Rome,N.Y. R6	.....12.35
Sharon,Pa. S3	.....12.35
Trenton,N.J. R5	.....12.65
Warren,O. B9	.....12.35
Worcester,Mass. A7, T6	.12.65

NAILS, Stock Sizes — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex D7	...$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	..$10.10

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	..177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	..$8.78
Atlanta A11	.....10.36
Bartonville,Ill. K4	.....8.88
Buffalo W12	.....10.26
Chicago W13	.....9.24
Crawfordsville,Ind. M8	..8.88
Donora,Pa. A7	.....8.78
Duluth A7	.....8.78
Fairfield,Ala. T2	.....8.78
Houston S5	.....9.02
Jacksonville,Fla. M8	....8.88
Johnstown,Pa. B2	.....8.78
Joliet,Ill. A7	.....8.78
KansasCity,Mo. S5	.....9.02
Kokomo,Ind. C16	.....8.88
LosAngeles B3	.....9.20
Minnequa,Colo. C10	....8.02
Pittsburg,Calif. C11	....9.20
S.Chicago,Ill. R2	.....8.78
S.SanFrancisco C10	....9.94
SparrowsPt.,Md. B2	....8.88
Sterling,Ill.(37) N15	....8.88

Coil No. 6500 Stand.
100 lb coil

AlabamaCity,Ala. R2	..$9.06
Atlanta A11	.....10.70
Bartonville,Ill. K4	.....9.16
Buffalo W12	.....10.60
Chicago W13	.....9.54
Crawfordsville,Ind. M8	..9.16
Donora,Pa. A7	.....9.06
Duluth A7	.....9.06
Fairfield,Ala. T2	.....9.06
Houston S5	.....9.30
Jacksonville,Fla. M8	....9.16
Johnstown,Pa. B2	.....9.06
Joliet,Ill. A7	.....9.06
KansasCity,Mo. S5	.....9.30
Kokomo,Ind. C16	.....9.16
LosAngeles B3	.....9.50
Minnequa,Colo. C10	....9.30
Pittsburg,Calif. C11	....9.50
S.Chicago,Ill. R2	.....9.06
S.SanFrancisco C10	..10.26
SparrowsPt.,Md. B2	....9.16
Sterling,Ill.(37) N15	....9.16

Coil No. 6500 Interim
100 lb coil

AlabamaCity,Ala. R2	..$9.11
Atlanta A11	.....10.75
Bartonville,Ill. K4	.....9.21
Buffalo W12	.....10.65
Chicago W13	.....9.59
Crawfordsville,Ind. M8	..9.21
Donora,Pa. A7	.....9.11
Duluth A7	.....9.11
Fairfield,Ala. T2	.....9.11
Houston S5	.....9.35
Jacksonville,Fla. M8	...9.21
Johnstown,Pa. B2	.....9.11
Joliet,Ill. A7	.....9.11
KansasCity,Mo. S5	....9.35
Kokomo,Ind. C16	.....9.21
LosAngeles B3	.....9.55
Minnequa,Colo. C10	....9.35
Pittsburg,Calif. C11	....9.55
S.Chicago,Ill. R2	.....9.11
S.SanFrancisco C10	..10.31
SparrowsPt.,Md. B2	....9.21
Sterling,Ill.(37) N15	....9.21

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	...212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	..214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — **Col.**

Birmingham C15	177
ChicagoHts.,Ill. C2 I-2	..177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	..193**
Aliquippa,Pa. J5	.....190§
Atlanta A11	.....197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	..198
Donora,Pa. A7	.....193†
Duluth A7	.....193†
Fairfield,Ala. T2	.....193†
Houston S5	.....198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	.....196§
Joliet,Ill. A7	.....193†
KansasCity,Mo. S5	.....198**
Kokomo,Ind. C16	.....195†
Minnequa,Colo. C10	....198**
Monessen,Pa. P7	.....196§
Pittsburg,Calif. C11	....213†
Rankin,Pa. A7	.....193†
S.Chicago,Ill. R2	.....193**
SparrowsPoint,Md. B2	..198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	..17.85	19.65
Bartonville K4	...17.95	19.80
Chicago W13	....17.85	....
Cleveland A7	....17.85	....
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	..18.35	19.90†
Houston S5	....18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	..17.85	19.65§
Kan.City,Mo. S5	..18.10	....
Kokomo C16	...17.95	19.50†
Minnequa C10	..18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	.17.95	19.75§
St'ling(37) N15	..17.95	19.80
Waukegan A7	..17.85	19.40†
Worcester A7	....18.15	....

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2	.....187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	.....191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	..192
Donora,Pa. A7	.....187†
Duluth A7	.....187†
Fairfield,Ala. T2	.....187†
Houston S5	.....192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	..190§
Joliet,Ill. A7	.....187†
KansasCity,Mo. S5	....192**
Kokomo,Ind. C16	.....189†
Minnequa,Colo. C10	..192**
Pittsburg,Calif. C11	....210†
Rankin,Pa. A1	.....187†
S.Chicago,Ill. R2	.....187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

6 to 8 gage	An'ld	Galv.
Ala.City,Ala. R2	..9.00	9.55**
Aliquippa J5	....8.65	9.325§
Atlanta(48) A11	..9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	....9.00	9.55†
Chicago W13	....9.00	9.55**
Cleveland A7	....9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	...9.00	9.55†
Duluth A7	.....9.00	9.55†
Fairfield T2	.....9.00	9.55
Houston(48) S5	..9.25	9.80**
Jack'vill.Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	....9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	..9.10	9.65†
LosAngeles B3	..9.95	10.625§
Minnequa C10	...9.25	9.80**
Monessen(48) P7	..8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	..9.95	10.50†
Rankin,Pa. A7	....9.00	9.55†
S.Chicago R2	....9.00	9.55**
S.SanFran. C10	..9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	.9.10	9.80
Struthers,O. Y1	..9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent.)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts. 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2¼	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	.....6.875
Gary,Ind. U5	.....6.875
Lackawanna,N.Y. B2	..6.875
Minnequa,Colo. C10	...6.875
Seattle B3	.....7.025
Steelton,Pa. B2	.....6.875
Torrance,Calif. C11	..7.025

JOINT BARS

Bessemer,Pa. U5	.....7.25
Fairfield,Ala. T2	.....7.25
Joliet,Ill. U5	.....7.25
Lackawanna,N.Y. B2	...7.25
Minnequa,Colo. C10	....7.25
Steelton,Pa. B2	.....7.25

AXLES

Ind.Harbor,Ind. S13	...9.125
Johnstown,Pa. B2	....9.125

SCREW SPIKES

Lebanon,Pa. B2	.....15.10

TRACK BOLTS, Untreated

Cleveland R2	.....15.35
KansasCity,Mo. S5	....15.35
Lebanon,Pa. B2	.....15.35
Minnequa,Colo. C10	....15.35
Pittsburgh S44	.....15.35
Seattle B3	.....15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	.....10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	....10.10
Lebanon,Pa. B2	.....10.10
Minnequa,Colo. C10	...10.10
Pittsburgh J5	.....10.10
Seattle B3	.....10.60
S.Chicago,Ill. R2	.....10.10
Struthers,O. Y1	.....10.10
Youngstown R2	.....10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in., and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
380	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	50.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates— 5%	Carbon Base 10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.96	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

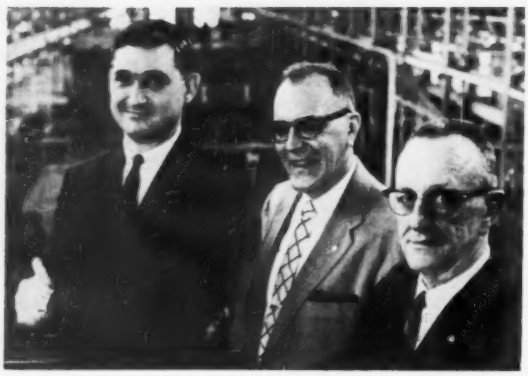
Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Central Steel & Wire can load



Left to right: Robert Hughes, Manager, Stainless Steel Sales; Ralph Kroll, Manager, Inside Sales; William Steinway, Shop Superintendent.

Stainless Steel

Order Stainless Steel
from your nearest
Steel Service Center

How's this for efficiency: at Central Steel & Wire Company's Cincinnati warehouse, they figure they can save six minutes per trip by sending a messenger with an order to a stock bay on a motor scooter. Some 70% of Central's orders are delivered the next day, and it's routine to have an order for steel on a truck within 30 minutes after it's received. Central at Cincinnati had its own private telephones installed as far away as Columbus, Dayton, Springfield and Hamilton, Ohio, because they thought the mails were too slow. Central is mechanized in this highly efficient way to keep over 5,000 Cincinnati customers happy.

The company encourages new ideas on how to improve operations from everyone in the organization from dispatchers to crane operators to the president (who can also dispatch, and operate the crane). Everybody's goal: even better service. Central feels that wasted time and excess paperwork must eventually be paid for by customers themselves, so these stumbling blocks to efficient operation are eliminated as much as possible. Central was founded in 1909 in Chicago, and still has customers from those early days. They weathered the depression by *doubling*

a Stainless Steel order in record time

their sales force (and sales increased during the period). Today, their field men are supported by a 30 million dollar inventory. Central's Cincinnati plant stocks Stainless Steel plate from 3/16″ to 3″ thick. Their equipment includes shears, saws, slitters and "Heliarc"* custom cutting. Central Steel & Wire is one of the first steel warehouses in the country to have "Heliarc" cutting facilities. By this process, Stainless can be cut to close tolerances with no change in machinability, no distortion or discoloration; magnetic permeability is unchanged; there is a minimum of carbide precipitation, iron powder or any other type of contamination confined to the immediate adjacent area. The Stainless is ready to fabricate. This is important to Central Customers like Contour Forming Inc. of Newark, Ohio, maker of nose cone preforms for the Nike missile.

Contour forms nose cones in one pass from blanks of ¼″ Type 304 Stainless. The blank is formed by the "Hydroforming"* process into an ogival shape, 6″ diameter x 6¾″ high. The blank is subjected to a 7-inch draw in which terminal forming pressures reach 15,000 psi. There is no fight between the die and the piece and practically no cold working. There is no galling and seizing between the members because the blank is fabricated without a female die. Why do they use Stainless? Because the clean-cut Stainless plate has superior metallurgical properties to meet the demands of the fabrication process *and* the end use. Tolerances must be met with microscopic accuracy; Stainless Steel's ease of fabrication solves the problem. It's another example of the versatility of Stainless Steel. From nose cones to milk dispensers, from paper making to food processing, Stainless Steel, supplied by Stainless warehouses like Central, makes products better. **Trademarks*

Stainless Steel has a higher first cost, but because of its unique combination of strength, corrosion resistance, and high temperature properties, it's worth more. In fact, no other metal can make such a material difference in so many applications. United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.

USS United States Steel

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Narlo, Ohio, $87.50. Dolomite-Magnesite: Narlo, Ohio, $109.50. Magnetite: Narlo, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in., grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.75-16.25*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Brands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill	(Per base box;
Products	100 lb base wt)
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85§
40 mesh, bags	7.50††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10	*56.80*
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	*56.00*
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.65	$5.70	$5.60	$5.50	$5.80
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.65	5.70	5.60	5.50	5.80
Channels	5.75	5.80	5.70	5.60	5.90
Plates (basic bessemer)	5.45	5.50	5.40	5.30	5.60
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	23.90	23.95	23.85	23.55	25.30
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.95	6.00	5.90	5.80	6.10
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.35	7.40	7.30	7.20	7.50

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Soaking pit tests at 2400°F prove THERMO-KANTHAL's outstanding reliability

A five-week test against costly platinum/ platinum-rhodium couples proved THERMO-KANTHAL's outstanding emf stability and long life. Deterioration was slight, even at this extreme temperature.

As a result, low-cost THERMO-KANTHAL thermocouple wire is now being used in production soaking pits, monitoring temperatures of 2200-2350°F. Replaced on a routine monthly basis, THERMO-KANTHAL is saving money for the steel industry.

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* Instrument Society of America

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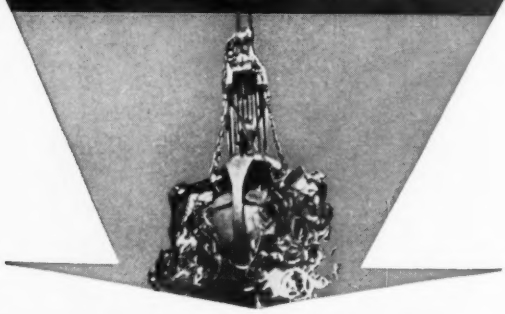

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Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

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Scrap Price Holds in Dull Market

Composite on No. 1 heavy melting is unchanged at $37 as domestic mills place only small tonnage orders. Exporters continue to move material, but their activity is waning

Scrap Prices, Page 144

• **Chicago**—Scrap prices are holding, although the market tends to the weak side. Mill purchases are extremely light as steel production is sagging to the lowest point in 11 weeks at 71 per cent of 1960 capacity.

Major needs of steelmaking furnaces are accommodated by hot metal of which there is an abundance with 28 of the district's 43 blast furnaces active.

Some foundries have concluded their vacation shutdowns and are resuming melting; others are still closed, or will close soon, for vacations. As a result, demand for cast scrap and some steel grades remains light.

• **Philadelphia**—The domestic scrap market is drifting. The price of No. 2 bundles is off slightly at $24-$26, delivered, but all other grades are steady. Mills are buying small tonnages steadily, and while exports shipments are slower, buying by dealers is no more than keeping pace with demand.

A cargo of 6000 tons of turnings from Muskegon, Mich., arrived here. The scrap was aboard the Norwegian ship *Gyda*, which took on additional tonnage at this port, all for shipment to Japan.

• **New York** — Brokers' buying prices have shown little change over recent weeks. Export demand is tapering, and domestic consumption is slow. However, collections of scrap are light, thus keeping the market in fair balance.

Machine shop turnings, mixed borings and turnings, and shovel turnings are off $1 a ton.

• **Pittsburgh**—With district steelmakers operating at about 60 per cent of 1960 capacity, there's little buying interest in scrap. Dealers are resigned to a long wait for more activity. Major consumers aren't likely to resume buying before the fourth quarter.

Brokers' bids on Pennsylvania railroad scrap were the same as or lower than those in June, except for specialties (up $2 to $3).

• **Youngstown** — Iron and steel scrap market in this area continues dull and listless. No new sales are reported and none is expected for the next few weeks.

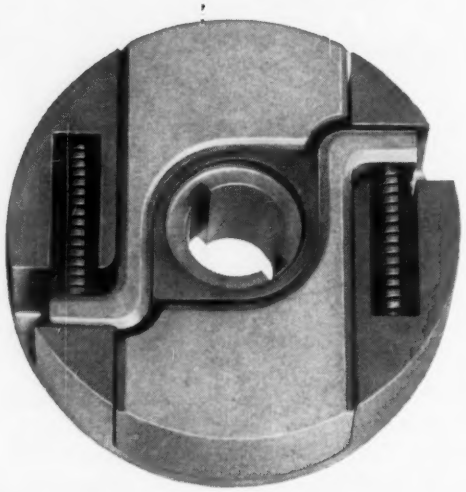
• **Buffalo**—An easier price tone has developed in the scrap market because of the lack of business. Consumer prices remain nominally unchanged.

Dealers say that prices will definitely be lower early in August unless mills come into the market with

THE AMPLEXOLOGIST

comes through in the clutch

Manufacturer's Problem: What type of clutch to use in a new, self-propelled product. *Solution:* Call the Amplexologist. *Result (shown):* A unique, heavy-duty centrifugal clutch with only two spring-operated friction shoes. Designed with a minimum of moving parts. Produced at minimum cost through advanced powder metallurgy.



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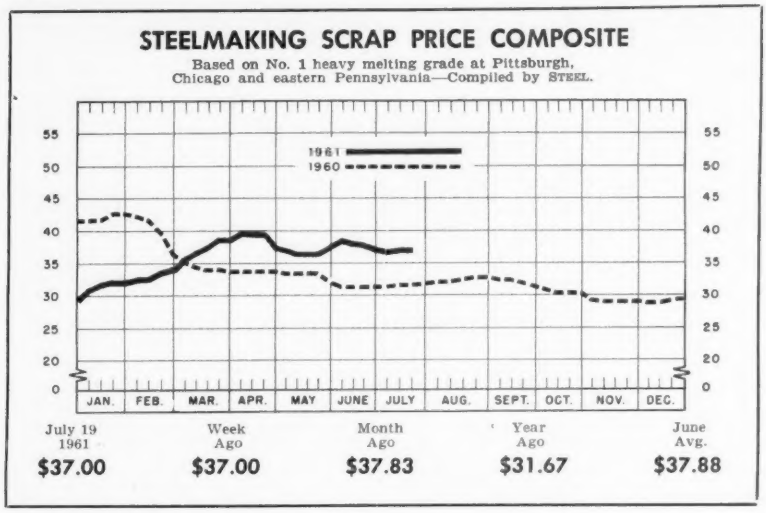
45 pages of technical information: How to determine correct applications for powder metal parts, bearings, filters.

2 NEW BEARING STOCK LIST
20 pages. 1066 standard sizes of Oilite self-lubricating bearings—bearing material. Selection guide, engineering data.



new orders next month. There is continued activity in the export market, with upstate New York dealers shipping material via the Seaway as well as by barge canal to New York City for export.

Great Lakes freighters have been one of the biggest export items here this year. At least half a dozen vessels are being scrapped overseas, along with their cargoes of scrap metal.

• **Detroit** — The scrap market is quiet. No major orders are out. A few dealer-to-dealer transactions are noted, with no significant changes in prices. August auto lists are expected to be about half of July's volume since most lines will be down for model changeover and the bulk of 1962 model production won't be substantial until September.

• **Cincinnati**—In the absence of a new buying test, prices are unchanged with No. 1 heavy melting at $32-33. Collections at dealer yards are slow. Area dealers estimate that tonnage demands from mills will not be high in August.

• **St. Louis**—The scrap market has firmed. Mills are doing a pretty good volume of business, and a relatively small amount of scrap is being generated. Export demand adds to the steadying influence. Brokers expect the price structure will improve this fall. Despite vacation closings in many plants, the whole tone of the market is notably better.

• **Houston** — Export buying has slowed. The over-all market appears to be weakening. Foundries are in a seasonal slump and major mills are not buying much.

One mill has indicated that it may place some new orders for scrap before the last of July, but at lower prices. The only price drop in the last week was on machine shop turnings, down $1 to a range of $10-$11.

• **Los Angeles**—The scrap market is in the throes of the traditional summer slump, with evidences of some surreptitious price cutting to stimulate demand. Export orders generally continue to dominate the market, with little activity from domestic mills. A few dealers report a slackening in export demand, offset by a slight pickup at the domestic level. Inventories are normal, with intake and outflow about evenly balanced.

• **San Francisco**—Steel scrap prices are firm in the face of negligible mill buying and only a moderate export volume.

• **Seattle**—Conditions in the scrap market are reasonably satisfactory. Prices are holding steady despite a seasonal lag in demand. The export section is fairly active and is the main support of current price levels. Some grades of scrap sought for export are scarce. Scrap shipments from this port amounted to 68,373 tons during the first five months of the year. Substantial tonnages continue to come from ship scrapping.

All of these shares having been sold, this announcement appears as a matter of record only.

Not a New Issue

727,200 Shares

Bethlehem Steel Corporation

Common Stock

Kidder, Peabody & Co.

July 11, 1961.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, July 19, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

July 19	$37.00
July 12	37.00
June Avg.	37.88
July 1960	31.63
July 1956	47.70

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	23.00-24.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	43.00-44.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	19.00-20.00
Cast iron borings	18.00-19.00
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	37.00-38.00
Heavy turnings	27.00-28.00
Punching & plate scrap	41.00-42.00
Electric furnace bundles	*43.00-44.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00§

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	*45.00-46.00*
Angles, splice bars	*44.00-45.00*
Railroad specialties	*45.00-46.00*
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	37.00-38.00
No. 1 hvy melt., dealer	35.00-36.00
No. 2 hvy. melting	30.00-31.00
No. 1 factory bundles	41.00-42.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	21.00-22.00
No. 1 busheling, indus.	37.00-38.00
No. 1 busheling, dealer	35.00-36.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	42.00-43.00
Punchings & plate scrap	43.00-44.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	36.00-37.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R. R. heavy melt.	38.00-39.00
R.R. malleable	47.00-48.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	44.00-45.00
Axles	56.00-57.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Railroad specialties	41.00-42.00
Rails, rerolling	62.00-63.00

CLEVELAND

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	41.00-42.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	35.00-36.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	39.00-40.00
Low phos. punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	49.00-50.00
Cast Steel	41.00-42.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	43.00-44.00
Angles, splice bars	*44.00-45.00*
Rails, rerolling	55.00-56.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	38.00-39.00
No. 1 bundles	39.00-40.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	40.00-41.00
Electric furnace bundles	40.00-41.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	27.50-28.50
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	32.00-33.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	39.00-40.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	*35.00*
No. 2 bundles	23.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	32.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	37.00
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	43.00
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	39.00
No. 2 heavy melting	35.00
No. 1 bundles	43.00
No. 2 bundles	*24.00-26.00*
No. 1 busheling	43.00
Electric furnace bundles	44.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	43.00-44.00
Couplers, springs, wheels	43.00
Rail crops, 2 ft & under	51.00-53.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	*4.50-5.00†*
Mixed borings, turnings	*5.00-5.50†*
Shovel turnings	*6.00-7.00†*
Low phos. structurals & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Mixed cast	30.00-31.00
Stove plate	27.00-28.00
Heavy breakable	26.00-27.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00
430 turnings	11.00-12.00

BIRMINGHAM

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	29.00-30.00
No. 1 bundles	*37.00-38.00*
No. 2 bundles	20.00-21.00
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plates	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	41.00-42.00
Angles, splice bars	44.00-45.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
Machine shop turnings	*10.00-11.00*
Low phos. plate & structurals:	
3 ft	38.00-39.00
2 ft and under	43.00-44.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	37.00-38.00

LOS ANGELES

No. 1 heavy melting	*40.00-42.00*
No. 2 heavy melting	*39.00*
No. 1 bundles	*40.00-41.00*
No. 2 bundles (export)	*30.00-31.00*
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Electric furnace scrap	50.00

Cast Iron Grades

No. 1 cupola	44.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00-42.00
No. 2 bundles	31.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable	38.00
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 1 hvy (unprepared)	39.00
No. 2 heavy melting	41.00-42.00
No. 2 hvy (unprepared)	36.00
No. 2 bundles	31.00
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Stove plate (f.o.b. plant)	37.00
Unstripped motor blocks	39.00

SAN FRANCISCO

No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	28.00**
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Cast iron borings	18.00
Heavy turnings	18.00
Shovel turnings	18.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

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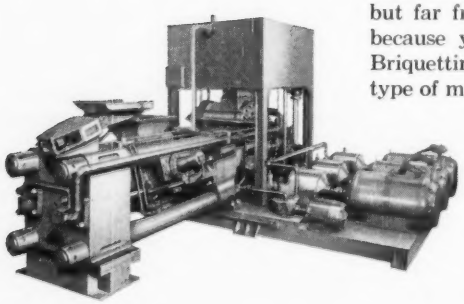

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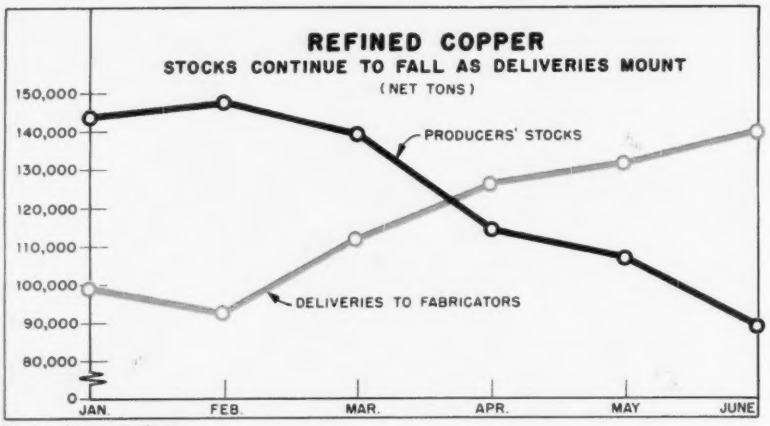
FOUNDRY EQUIPMENT DIVISION
6494 Grand Division Avenue
Cleveland 25, Ohio

Copper Sales Headed for Five Year High

Nonferrous Metal Prices, Pages 148 & 149

U. S. PRIMARY COPPER sales this year should be the highest since 1956. It remains to be seen whether the tonnage that finds its way into the hands of the ultimate consumer, as reflected chiefly by brass and wire mill sales, will show equal improvement.

Based on official statistics for the first half, STEEL estimates 1961 deliveries of refined copper to fabricators should rise at least 10 per cent to 1.4 million tons. The estimate may be conservative. While sales show every indication of tapering off this month and next, the traditional lull may be less pronounced than usual this year. A stronger than anticipated fourth quarter would also make the estimate conservative.



Source: Copper Institute

• **Good First Half**—Through the first half, deliveries of U. S. refined copper to fabricators totaled 702,723 tons vs. 1,279,745 tons in all of 1960. Shipments of 139,700 tons in June (see chart) were the best in two years.

Mine output, despite announced production cuts by some producers earlier in the year, should exceed 1960's. So should refined output. But because of steadily rising sales over the last four months, producer stocks are down sharply. At 144,000 tons at the end of January, they had fallen to 89,000 tons by June 30.

The imponderable element is the status of consumer inventories. There was undoubtedly some stockpiling above normal inventory needs as a hedge against a possible strike at Kennecott Copper Corp., the nation's number one producer. The extent of those stocks is the question. Earlier this month, Kennecott signed a contract with the International Union of Mine-Mill & Smelter Workers, which represents the majority of its miners. While Kennecott still has to pen an agreement with the United Steelworkers of America, when the current contract expires at the end of this month, observers believe chances for a strike are slight. The effect of a peaceful settlement on sales will probably remain a mystery until the fall.

Further stock workoff by producers will probably bring some increase in mine output. It would also bring pressure for a modest price increase.

Magnesium Improving

Magnesium sales should improve modestly this year. The industry still reflects the uncertainty of certain defense spending. A decision to build up manned aircraft strength would be helpful to the magnesium industry.

Ingot shipments are still outrunning production. But look for some idle primary capacity to be reactivated soon. Reason: Stocks are beginning to run low.

Wrought products and diecastings continue to be the fast growing magnesium categories.

No Silver Shortage

Price, not supply, is the real question in silver, says Handy & Harman, New York, major silver fabricator. Consumption has exceeded new production for the last several years, but statistics do not tell the whole story, says the company. "Historically, there have always been secondary sources of silver becoming available at different price levels. Right now, Treasury is a source, and there will be others in the future."

Sees Handy & Harman: So long as the U. S. Treasury maintains its present silver policies, continued price stability for the short term.

Aluminum Notes

• Exports of crude aluminum, the big plus for producers in otherwise dull 1960, continue to decline. For the first five months, the figures read 55,850 tons compared with 137,150 tons in the same period last year. Semifabricated products exports are up: 12,100 tons vs. 7150 tons in 1960. So are scrap exports at 38,800 tons vs. 33,350 tons in 1960's like period.

• Fuel mixes for solid propellent rockets will burn up 17,500 tons of fine aluminum powder annually by 1965. The forecast comes from Edward F. Reilly, market manager, Revnolds Metals Co., who says several million pounds of aluminum powder are used annually in missile fuels.

• In 1960, more than 330 million sq ft of aluminum were installed on some 280,000 new or remodeled homes, says Reynolds. Forecast: Use of aluminum siding on 521,000 homes in 1965.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 31.00 deld.; custom smelters, 31.00 nom.; lake, 31.00 deld.; fire refined, 30.75 deld.

Germanium: First reduction, ingots, less than 1 kg 36.00-37.50 per gram; 1-10 kg 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $193-197 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pigs, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 115.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max, 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof, 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam. 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.00	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6063-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.50; .125 in., 98.10; 188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in. 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 22.75-23.25; light copper, 20.00-20.50; No. 1 composition red brass, 20.50-21.00; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES d (Based on copper at 31.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	50.36–51.36	....	57.32	27.00	27.00	26.25
Yellow Brass	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80%	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85%	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90%	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10%	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.50-20.00; new brass clippings, 18.00-18.50; light brass, 15.00-15.50; heavy yellow brass, 15.00-15.50; new brass rod ends, 17.00-17.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.25-17.75; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated low copper clips, 10.75-11.25; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.50-10.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50; clean borings and turnings, 8.50-9.00; segregated low copper clips, 13.50; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50-13.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 28.25; No. 2 heavy copper and wire, 26.00; light copper 23.75; refinery brass (60% copper) dry copper content, 24.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.00; No. 2 heavy copper and wire, 26.00; light copper, 23.75; No. 1 composition borings, 23.00; No. 1 composition solids, 23.50; heavy yellow brass solids, 18.00; yellow brass turnings, 15.50; radiators, 19.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 133.50; 200-499 lb, 132.00; 500-999 lb, 131.50; 1000 lb or more, 131.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 86.00; 100-600 lb, 76.30; 700-1900 lb, 73.60; 2000-9900 lb, 71.70; 10,000 lb or more, 70.40.

Stannous Chloride (Anhydrous): 100 lb, 144.20; 400 lb, 134.20; 800-19,900 lb, 112.90; 20,000 lb or more, 108.70.

Stannous Sulphate: Less than 50 lb, 151.70; 50 lb, 121.70; 100-1900 lb, 119.70; 2000 lb or more, 117.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

Rails, Cars . . .

Track Material Prices, Page 135

An order for 475 freight cars costing $4,500,000 has been placed with the Pullman-Standard Div., Pullman Inc., by the Gulf, Mobile & Ohio Railroad. Most of the cars will be built in Pullman's Bessemer, Ala., plant. About 1300 employees will be recalled Aug. 1 and a majority of the plant's workers will be on the job by Aug. 14 when production on the order starts.

The order covers four hundred, 50 ft boxcars to be built at the Bessemer plant and 75 covered hopper cars to be delivered from Pullman's plant at Butler, Pa.

Pig Iron . . .

Pig Iron Prices, Page 137

Hanna Furnace Corp. has resumed production at its merchant iron plant in Buffalo which had been shut down since late May. The firm has blown in one of four blast furnaces. There is little prospect of adding any more blast units at this plant before the fourth quarter, a company spokesman says.

Phoenix Steel Corp. will blow in its Chester, Pa., blast furnace Aug. 1. Down since May, 1960, the furnace has been equipped with a larger blower, which will increase its former annual capacity of 200,000 net tons.

Demand for merchant iron continues slow due mainly to seasonal factors. Many foundries will be out of the market until August when iron demand should improve.

Youngstown Sheet & Tube Co. took off a blast furnace at its Brier Hill Works, Youngstown, and Republic Steel Corp. took off one unit at its Youngstown Works.

Structural Shapes . . .

Structural Shape Prices, Page 132

Highway construction projects continue to involve considerable tonnages of shapes. Building erection is also active.

The outlook for fabricators seems slightly better, but competition is increasingly keen. The volume of unplaced structural tonnage is mounting in New England. New work is coming out in heavier vol-

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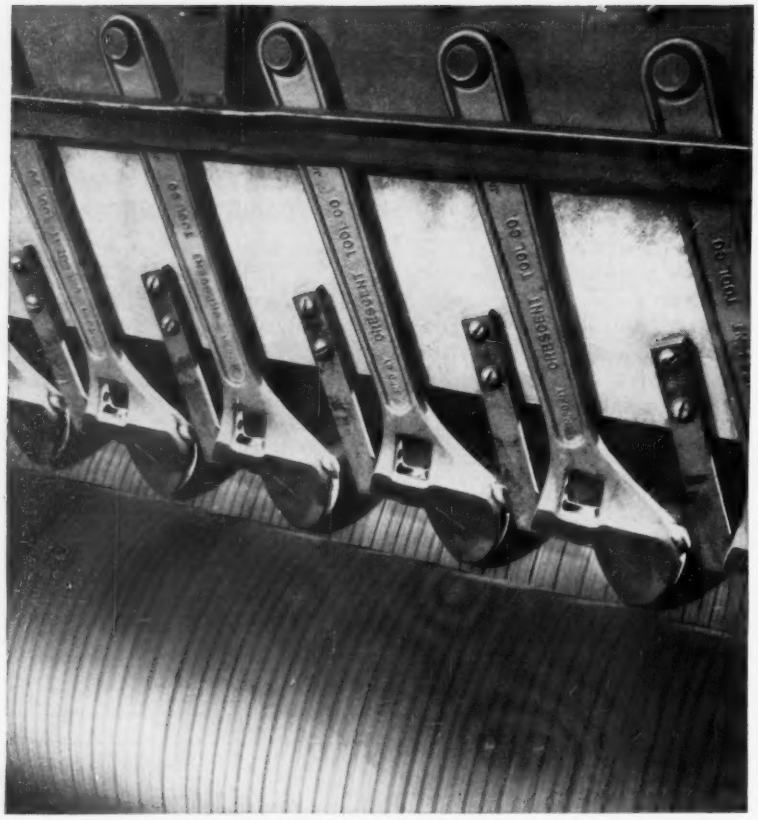

AUTOMATIC BRUSHING SETUP buffs mirror finish on 12" wrench parts for plating. Multiple parts are mounted in special removable fixture. Machine automatically positions and oscillates parts between brushing heads for 25 strokes per cycle. Each head is made up of 65 Osborn Bufcut® treated cord brushes.

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OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

ume than shop bookings; after bids are in, there is a longer than normal period before placing of contracts for fabrication. As a result, a substantial tonnage of structural steel is backing up and is unplaced. The Prudential Center program in Boston, already delayed for months, has been partially reduced by the elimination of six, 25 story apartment buildings.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

6400 tons, 2040 ft elevated bridge between 28th Place and Stewart Avenue for South Expressway, Chicago, for City of Chicago, to American Bridge Div., United States Steel Corp., Pittsburgh.

2035 tons, transmission towers, Central Valley project, Bureau of Reclamation, Denver, (IFB DS 5582) Sch. 1 and 2, to Creamer & Dunlap Inc., Tulsa, Okla.

500 tons, estimated, including tower, radar facilities, Cambria and Boron Air Force Stations, California, to Electro Steel Structures Inc., and Western Erectors Inc., Rialto, Calif.

372 tons, two 3-span and one 4-span wide flange bridges, I-89-3 (14), contract 3, South Burlington, Vt., to Vermont Structural Steel Co., Burlington; W. H. Hinman Inc., Westbrook, Maine, general contractor; also 3600 linar feet of steel piles to same supplier.

125 tons, hoists and castings, Wanapun Dam, Columbia River, to Berger Industries Inc., Seattle.

125 tons, gantry crane for U. S. Engineer, Omaha, Nebr., to Berger Industries Inc., Seattle.

100 tons, radar tower, Makah Air Station, Washington State, to Isaacson Iron Works, Seattle.

STRUCTURAL STEEL PENDING

3835 tons, bridge, Southwest Freeway at South Capitol Street structure, Federal Aid project No. C-61152-H, Washington, D. C.; bids Aug. 1, Department of Highways, District of Columbia, Washington.

400 tons, Montana state, 708 ft Missouri River bridge; bids in at Helena, July 19.

260 tons, apartment structure; bids in at Portland, Oreg.

250 tons, (also 25 tons reinforcing bars), Yakima County, Washington, 400 ft Yakima River bridge; alternate bids involve 200 tons of shapes and 30 tons of reinforcing bars; bids to Harold Sweet, county engineer, Aug. 2.

200 tons or more, aerial tramways, Cape Newenham and Northeast Cape, Alaska; general contract by U. S. Engineer, to Chris Berg Inc., Seattle, at $698,790 for 1962 construction.

150 tons, Ketchikan, Alaska, hospital; J. B. Warrack Co., Seattle, apparently low at $1,739,000.

125 tons, Joel E. Ferris Sr. High School, Spokane, Wash.; general contract to Selkirk Construction Co., low at $2,039,104.

90 tons, two calibration centers, Washington State; general contracts awarded by U. S. Engineer, Seattle.

100 tons or more, steel frame warehouse, J. D. Ross substation, Clark County, Washington; bids to Bonneville Power Administration, Portland, Oreg., Aug. 9.

100 tons or more, radar tower, Cut Bank, Mont.; general contract to Joseph A. Bass Co., Minneapolis, low $235,000, by U. S. Engineer, Seattle.

REINFORCING BARS . . .

REINFORCING BARS PLACED

206 tons, three wide flange highway bridges, I-89-3(14) contract 3, South Burlington, Vt., to Vermont Structural Steel Co., Burlington; W. H. Hinman Inc., Westbrook, Maine, general contractor.

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200 tons, Washington state span and piers, Clark County; Hannan Bros. Co., Portland, Oreg., low $250,755.

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July 31

IN

STEEL

How to Avoid Shortcomings In Plating

Better use of plating on parts can cut costs, reduce service failures. Are you getting the best job? Next week, STEEL will show how better specifications, related to service requirements, can lead to the right plating process for the job. Experts will tell you what to look for.

It's part of a series aimed at helping you get better reliability while holding costs in line. Watch for it in the July 31 STEEL.

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Jet pilots are thankful for our catapults and over-run barriers. Steelmakers and rolling mill operators are long familiar with our metalworking rolls, our roll turning lathes . . . our tube straighteners . . . and our rolling mills themselves. In special contract manufacturing, we're in radio astronomy, missilery, radar and many other areas.

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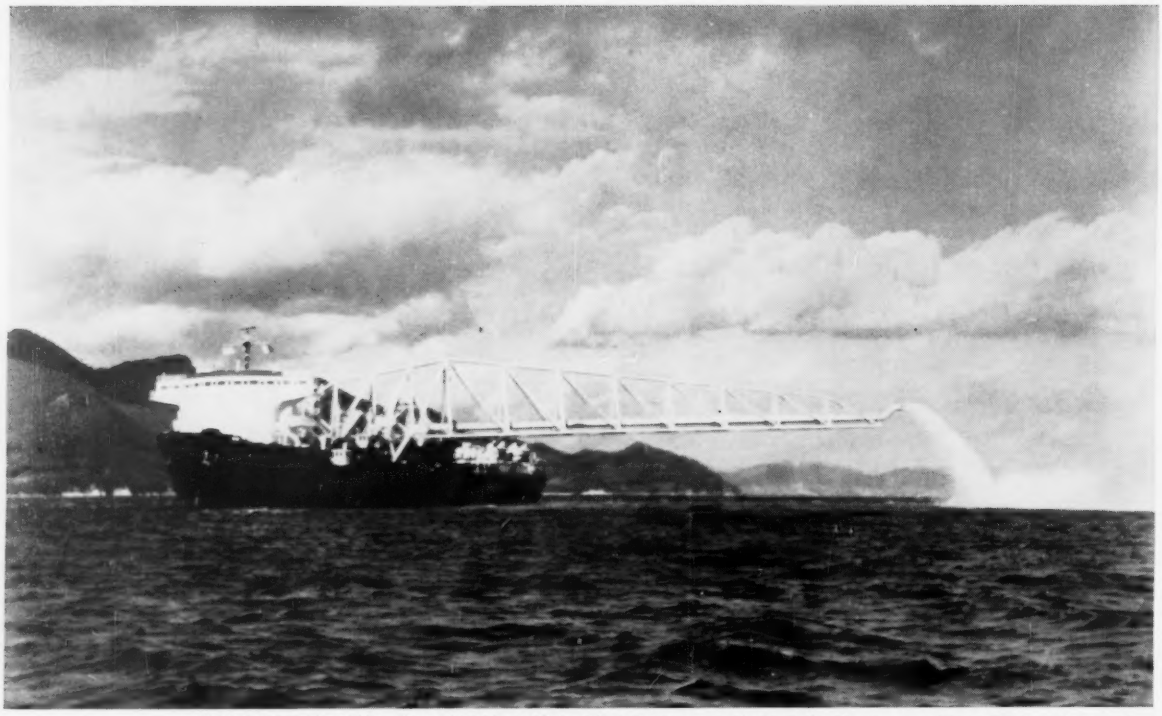
Perhaps most unusual of all of Bliss' many facets, however, is the construction of complete "turn-key" plants—where we assume the worry for every problem from pouring the foundation to cutting the opening-day ribbon. These projects run the gamut, from a complete can line to an entire steel mill cold rolling department.

It's an exciting world—this growing, changing world of Bliss. And every once in a while we have to pause, take stock, and realize how many different segments of industry we're honored to work with.

BLISS is more than a name...it's a guarantee

BLISS
SINCE 1857

E. W. BLISS COMPANY, CANTON, OHIO

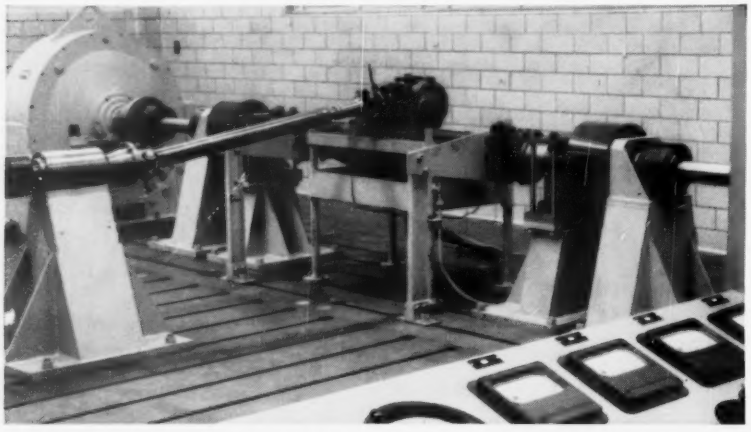


"Zulia" designed by Welding Shipyard Division of National Bulk Carriers; owned by Seadredge Company, an affiliate of National Bulk Carriers.

One Timken® bearing centers 1,000-ton boom on world's largest dredge

The channel dredge, "Zulia", mounts a whopper of a boom—1,000 tons, 437 ft. long. It pivots in a 180 degree arc. To maintain the radial position of the discharge boom and take the tremendous loads, the designers worked with Timken bearing sales engineers to select the best bearing for the job. Only one was needed, a 72″ bore, 79″ O.D. double-row bearing. Best of all, this is a standard Timken® tapered roller bearing—showing the huge size range available. And Timken bearings are also used in the Cone-Drive reducer that drives the boom's rotating base.

Their tapered design lets Timken bearings take any combination of radial and thrust loads. Full-line contact between rollers and races gives *extra* load-carrying capacity. And because Timken bearings are designed to roll true, they virtually eliminate friction.



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